Air Cooled Scroll Chiller

Service Manual

（T1/R407C/50Hz）

GREE ELECTRIC APPLIANCES INC. OF ZHUHAI

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PRODUCT

PRODUCT

1 MODELS LIST

Model Name	Capacity (kW/Ton)		Power Supply	Ref.	Appearance
	Cooling	Heating			
LSQWF65M/N-M LSQWRF65M/N-M	60/17	65/19	400V-3N-50Hz	R407C	
LSQWF80M/N-M LSQWRF80M/N-M	76/22	80/23			
LSQWF130M/N-M LSQWRF130M/N-M	120/34	130/37			

Note:1Ton =12000Btu/h = 3.517Kw

2 NOMENCLATURE

LS	QW	R	F	80	M	/	N	—	M
1	2	3	4	5	6		7		8

NO.	Description	Options
1	Water Chiller	—
2	Compressors Type	Hermetic Scroll Compressors
3	Function Code	Omitted-Cooling Only R-Heat Pump
4	Air Cooled	—
5	Nominal Cooling Capacity	65——60 kw 80——76kw 130——120kw
6	Modular	—
7	Development series number	—
8	Voltage Code	M—380V-3N-50Hz、 400V-3N-50Hz、 380~415V- 3N-50Hz

3 FUNCTION

Function	Description
High Efficiency Full Load Operation	Utilizing new scroll compressor technology, the chillers meet or exceed the performance requirements of ASHRAE 90.1.All system components are selected for optimum performance, including the condenser coil areas and evaporator sizes.
Excellent Part Load Performance	By using two compressors on each chiller, unloading characteristics and part load performance are outstanding. Integrated part load value (IPLV) is a part load performance indicator as outlined in ARI standard 550/590-1998.the IPLV rating compress the performance of different chillers under identical conditions. When the IPLV is listed in EER(Energy Efficiency Ratio),a higher EER will indicate that the chiller's overall performance is better.
Compact Design With Small Footprint	The chillers have a reputation for a compact design and small footprint. A small footprint can save installation costs by minimizing the size of the concrete mounting pad or reduces the amount of structural steel if the unit is mounted on the rooftop.
Quiet Operation	The chillers are designed with quiet scroll compressors. Fans are selected for good performance and lower sound levels. The attention to detail with sound is critical in the design. Small issues such as refrigerant piping, supports for piping, securing components to the structure are all important to making a quiet product. We proudly publish our sound performance.
Superior Controls	GREE has provided the latest technology in controlling the chillers. The new controller provides a "user friendly" environment for the operator. The control logic is designed to provide maximum efficiency, to help provide continuing operation in unusual operating conditions through proactive controls, and to provide a history of conditions to aid in problem resolutions. Perhaps the greatest benefit is the protocol for integrating with your building automation system(BAS)

4 PRODUCT DATA

4.1 Product Data at Rated Condition

Models		Cooling Only	LSQWF__M/N-M		
			65	80	130
		Heat Pump	LSQWRF__M/N-M		
			65	80	130
Nominal Capacity	Cooling	kW	60	76	120
		Ton	17	22	34
	Heating	kW	65	80	130
		Ton	19	23	37
Power Input	Cooling	kW	22.6	28.7	45.3
	Heating	kW	21.7	26.7	43.3
Power Supply			400V-3N-50Hz		
Running Control			Microcomputer Auto Control; Running Status Display; Abnormal Status Alarm		
Safeties			High-Low Pressure Protection; Discharge Temp Protection; Motor Overload Protection; Anti-freeze Water Flow Protection; Low Water Flow Protection; Phase Sequence Protection; Compressor Overload Protection; Compressor Inset Protection; Presure Differential Protection;		
Compressor Type			Hermetic Scroll Compressors		
Refrigerant Type			R407C		
Cooler	Water Flow	m^3/h	10.3	13.1	20.6
		GPM	45.4	57.7	90.7
	Pressure Drop	kPa	10	15	17.5
	Heat Exchanger		Shell and Tube Evaporator		
	Max. Pressure	MPa	1		
	Water In/Out Pipe Diameter	mm	DN65	DN65	DN80
Condenser	Heat Exchanger		Finned Coil Type Condenser		
	Fan Motor Power Input	kW	1.15×2	1.15×2	0.75×4
Outline/ Package Dimension	Width	mm	2110/2190	2110/2190	2410/2490
	Depth	mm	1100/1180	1100/1180	1900/1980
	Height	mm	2140/2140	2140/2140	2240/2240
Net Weights (Heat Pump)		kg	940	1030	1670
Operation Weights		kg	1034	1133	1837

(Heat Pump)				
Net Weights (Cooling Only)	kg	905	985	1565
Operation Weights (Cooling Only)	kg	996	1084	1722

Notes:

① Nominal capacities are based on the follow conditions:

② Parameter refer to the nameplate;

Item	Water side		Air side	
	Water flow $m^3/(h \cdot kw)$	Leaving Water ℃/℉	Dry-bull temp. ℃	Wet-bull temp. ℃
Cooling	0.172	7/45	35/95	—
Heating		45/113	7/45	6/43

4.2 Operation Range

Item	Water side		Air side
	Leaving Water (℃/℉)	Temperature Difference of Water (℃/℉)	Air on Condenser (℃/℉)
Cooling	5～15℃/ 41～59℉	2.5～6℃/ 37～43℉	18～48℃/ 64～119℉
Heating	40～50℃/ 104～122℉	2.5～6℃/ 37～43℉	-15～24℃/ 5～75℉

4.3 Electric Data

Model	Rated Power Supply	Compressor			Fan Motor		Total	
		Qty.	MRC each	NRC each	Qty.	NRC each	MRC	NRC
LSQW(R)F65M/N-M	400V-3N-50Hz	2	31	22.1	2	2.3	66.6	48.8
LSQW(R)F80M/N-M		2	38	27.2	2	2.3	80.6	59
LSQW(R)F130M/N-M		2	54	41.4	4	3	120	94.8

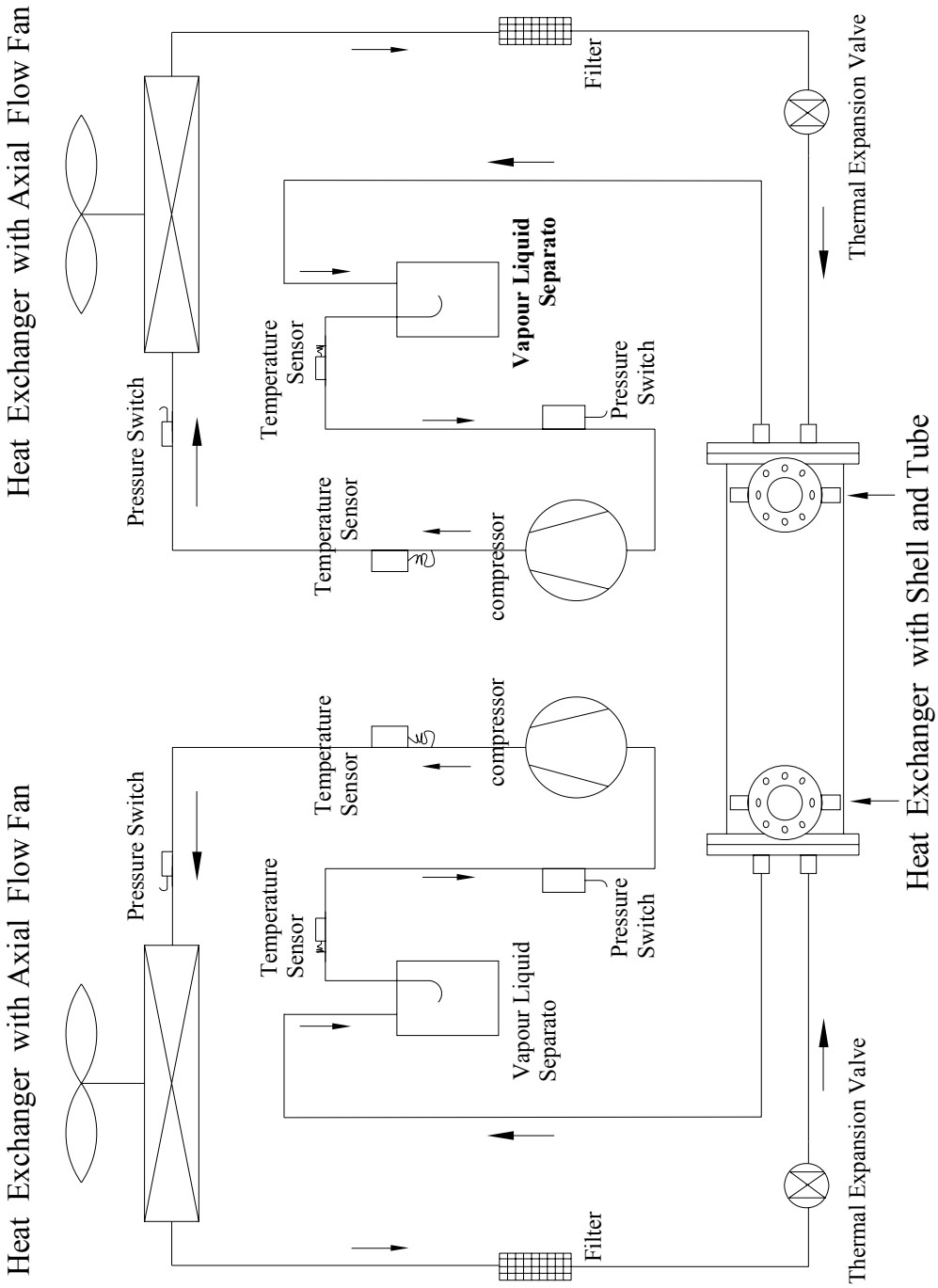
Notes:

MRC: Maximum running current (A)

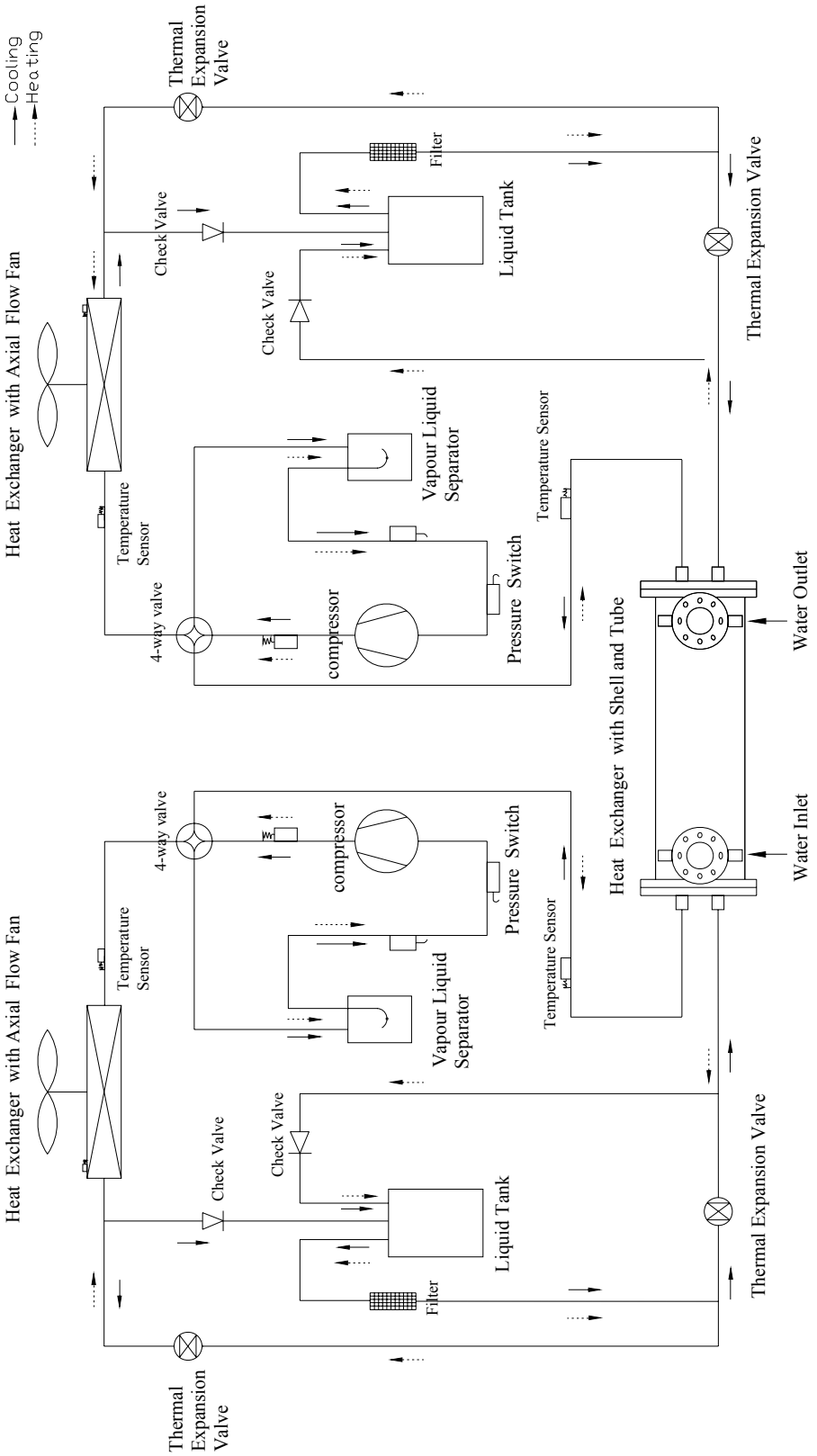
NRC: Nominal running current (A)

5 PIPING DIAGRAM

5.1 Cooling Only



5.2 Heat Pump

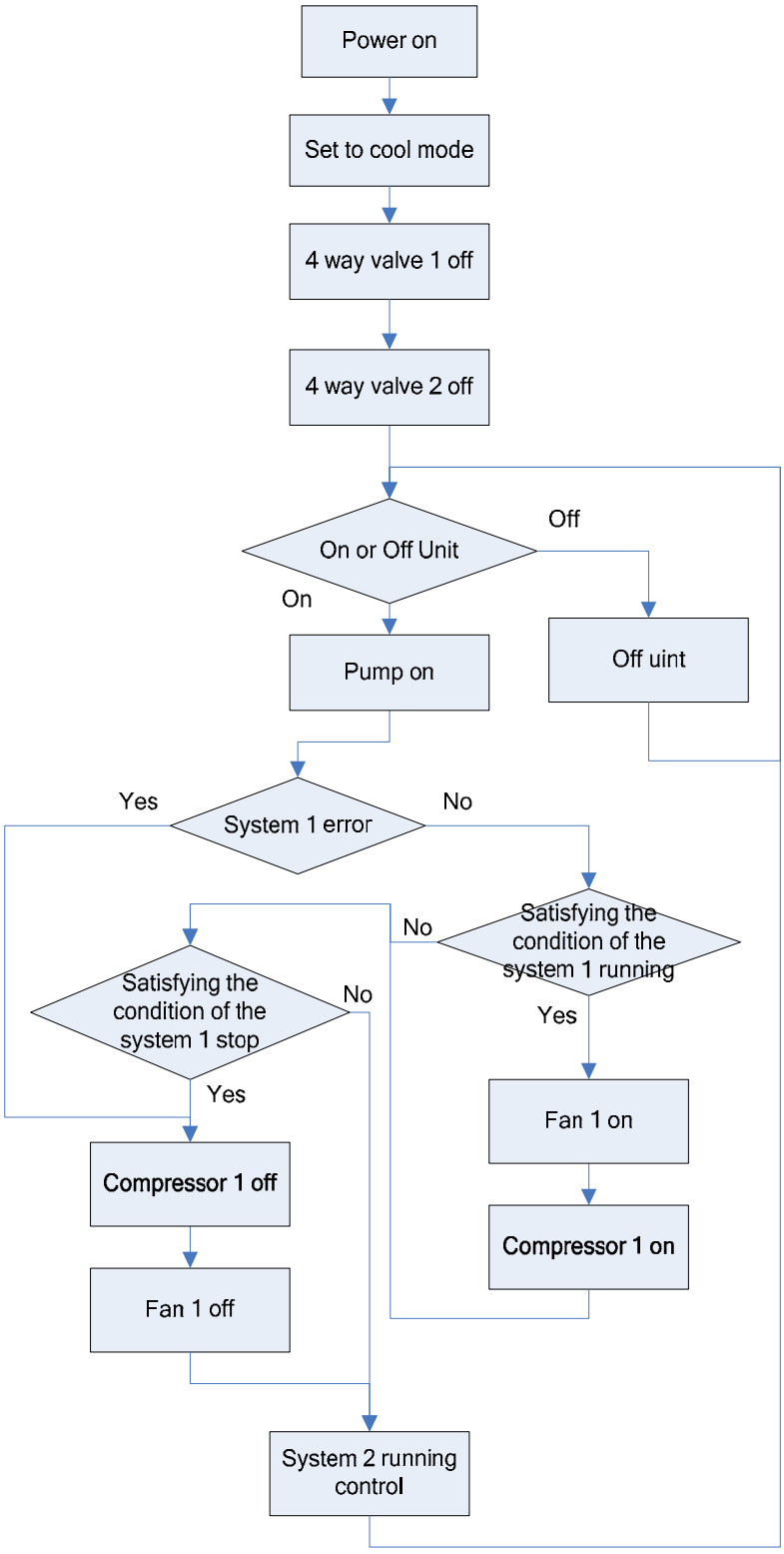

Cooling
Heating
Thermal Expansion Valve
Filter
Liquid Tank
Check Valve
Check Valve
Thermal Expansion Valve
Heat Exchanger with Axial Flow Fan
Vapour Liquid Separator
Temperature Sensor
Temperature Sensor
Pressure Switch
4-way valve
compressor
Heat Exchanger with Shell and Tube
Water Outlet
Water Inlet
4-way valve
compressor
Pressure Switch
Temperature Sensor
Heat Exchanger with Axial Flow Fan
Temperature Sensor
Vapour Liquid Separator
Check Valve
Check Valve
Thermal Expansion Valve
Liquid Tank
Filter
Thermal Expansion Valve

CONTROL

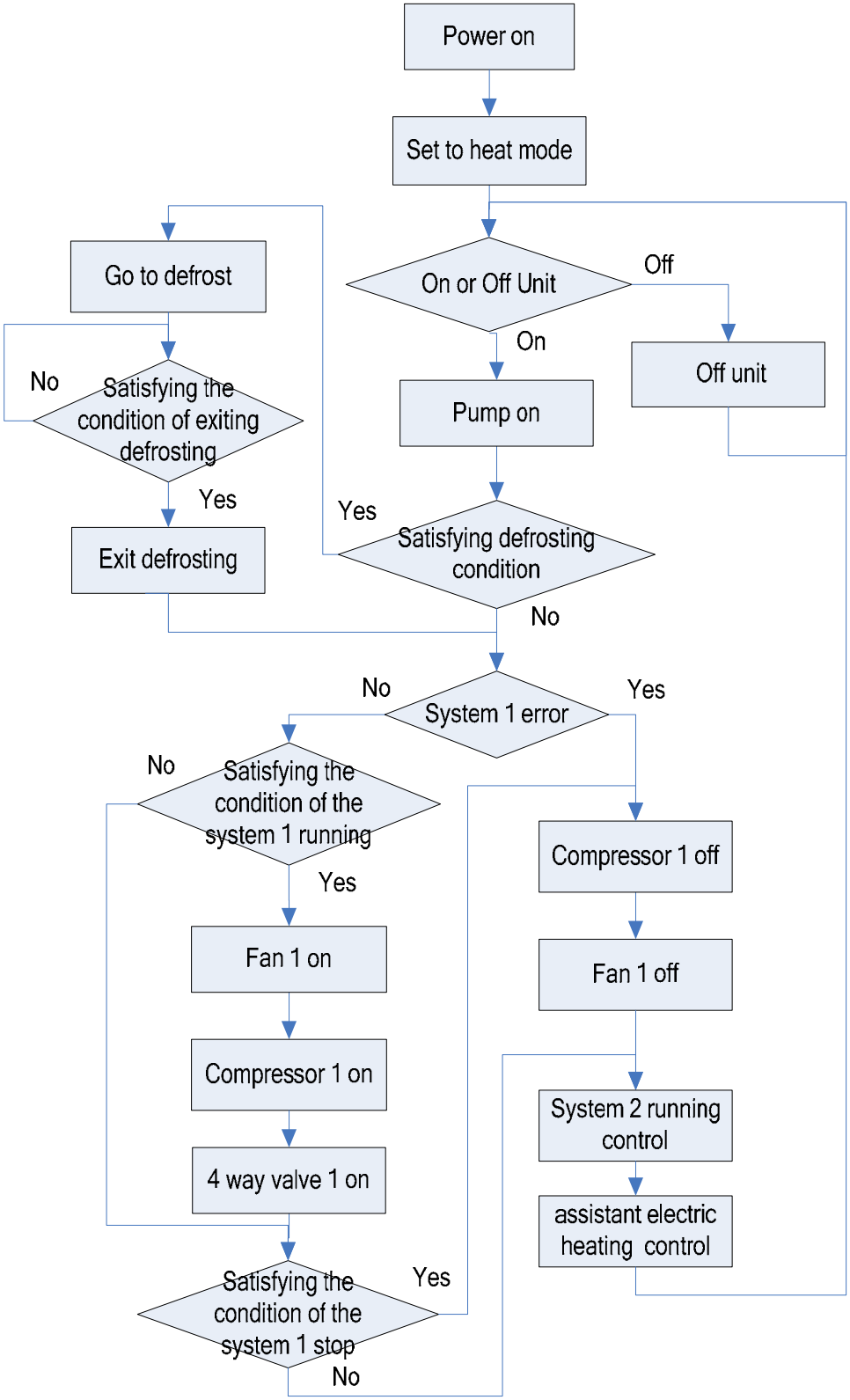
CONTROL

1 OPERATION FLOWCHART

1.1 Cooling Operation



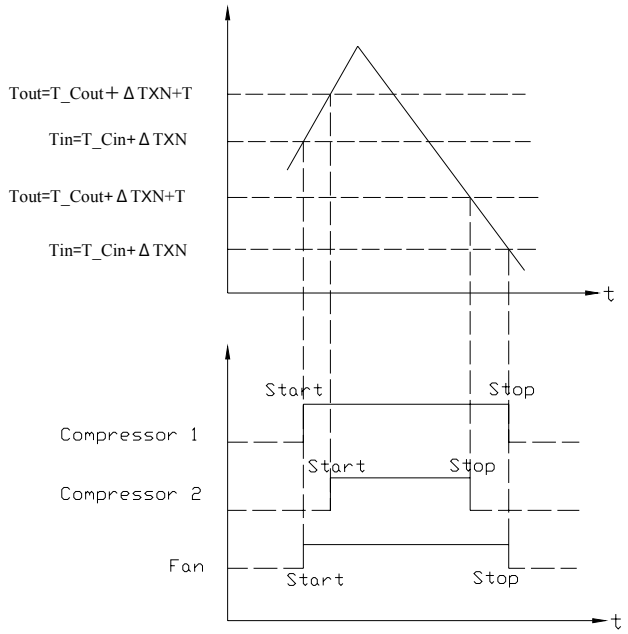
1.2 Heating Operation



2 MAIN LOGIC

2.1 Cooling Mode

In cooling mode, the four way valve is always off as long as the controller is energized and it hasn't anything to do with the states of compressor and fan.



（1）Control of compressor

For the module n, N＝n & 0x03,ΔT＝0.5,T＝0.3.Compressor 1 and 2 will start and stop in fixed time.

Compressor 1:

When Tin≥T_Cin＋ΔT×N, compressor 1 is on.

WhenTout≤T_Cout＋ΔT×N, compressor 1 is off.

Under other conditions, it keeps original.

Compressor 2:

When Tin≥T_Cin＋ΔT×N+T, compressor 2 is on.

When Tout≤T_Cout＋ΔT×N+T, compressor 2 is off.

Under other conditions, it keeps original.

（2）Control of fan

Dual-fan system

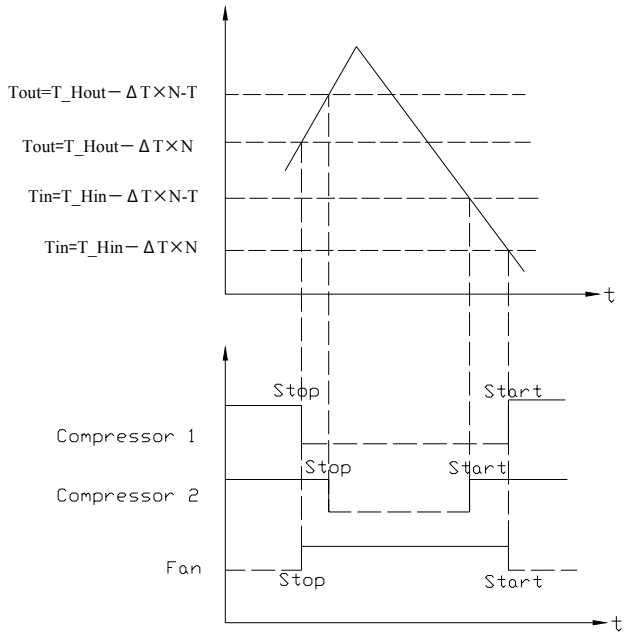
If both of the compressors are off, fan A will be off. If either of the compressor or both of them are on, fan A will be on.

4-fan system

If compressor 1/2 is off, fan A/B will delay 30s to be off.

If compressor 1/2 is on, fan A/B will have been on prior to 30s.

2.2 Heating Mode（Defrosting/ Auxiliary Electric Heater(E-heater)）



（1）Control of compressor

For the module n, N＝n & 0x03,ΔT＝0.5,T＝0.3.

Compressor 1:

When Tin≤T_Hin－ΔT×N, compressor 1 is on.

When Tout≥T_Hout－ΔT×N, compressor 1 is off.

Under other conditions, it keeps original.

Compressor 2:

When Tin≤T_Hin－ΔT×N-T, compressor 2 is on.

When Tout≥T_Hout－ΔT×N-T,compressor 2 is off.

Under other conditions, it keeps original.

（2）Control of fan

It is the same as that in cooling mode.

（3）Control of 4-way valve

a. For the first startup of unit from cooling mode to heating mode, the 4-way valve is energized after compressor is on for 20s.

b. For common startup (manual or timer) of the unit in heating mode, the 4-way valve will stop after it starts for 40s and then it restarts after the compressor is on for 20s.

c. If the compressor in heating mode is turned off at the setting temperature point, the 4-way

valve is still energized. If the unit is turned off by operating the displayer, the 4-way valve will be de-energized after the compressor is off for 2min.

（4）Defrosting control

Auto defrosting staring conditions (3 conditions must be met simultaneously)

a. Accumulative running time of compressor exceeds interval between the defrosting times.

b.The temperature detected by the defrosting sensor reaches defrosting start condition

c.Accumulative running time of compressor reaches 4min and 50s.

If the above 3 conditions are met simultaneously, the dual systems defrost at the same time.

d. Defrosting temperature reaches end condition. The following detailed conditions are met:

e.Defrosting time reaches setting time.

Dual-fan system

If defrosting temperature of one system (a) reaches end condition, operate according to the following two conditions:

1）If system (b) has not reached end temperature, system (a) will be off to wait untill system (b) reaches end condition. After that, they enter into heating operation together.

2）If system (b) also reaches end condition, both of the systems end defrosting and enter into heating operation.

Under conditions 1) and 2), 4-way valve after defrosting to heating will firstly open and the fan will be on after 5s.If compressor is originally on, it also keeps this state. If is originally off, it will restart after 3-min stop at least.

4-fan system

If a certain system met the end condition, the fan will be on and then stop after 10s. After 8-s stop of fan, if end temperature is detected again, the system directly enters into heating operation.

（5）Auxiliary heating control

If auxiliary heating function is on by operation of displayer, the unit will control the auxiliary electric heater on/off according to inlet water temperature.(First startup of the unit, auxiliary electric heater will start after 15min of the unit)

If Tin ≤T1 detected by the inlet water temp. sensor, the second group of E-heater (auxiliary electric heater) run.

If Tin≥T2, the second group of E-heater stop.

If T1＜Tin＜T2, the second group of E-heater keep original state.

If Tin ≤T1+1 detected by inlet water temp. sensor, the first group of E-heater run.

If Tin≥T2+1, the first group of E-heater stop.

If T1+1＜Tin＜T2+1, the first group of E-heater keep original state.

If turning off control function of E-heater by display board, E-heater won't run.

2.3 Antifreezing Protection Control

If auto antifreezing function is turned on by display board at unit off under heating mode, the unit will have this function.

If antifreezing temp. of any module Tfi <＝3.5℃ (adjustable), corresponding water pump will start.

If antifreezing temp. of any module Tfi <＝1.5℃, the unit will heat with E-heater off.

If antifreezing temp. of all modules Tfi >＝15℃, the unit will stop.

If antifreezing temp. of any module 1.5<Tfi <15℃, the unit will keep original state. i = 1,2.

If auto antifreezing function is turned off by display board, the unit will quit this function.

2.4 Control of 4-Way Valve

4-way valve is always off in cooling mode. Refer to 2.2 for control of 4-way valve in heating mode.

2.5 Control of Water Pump

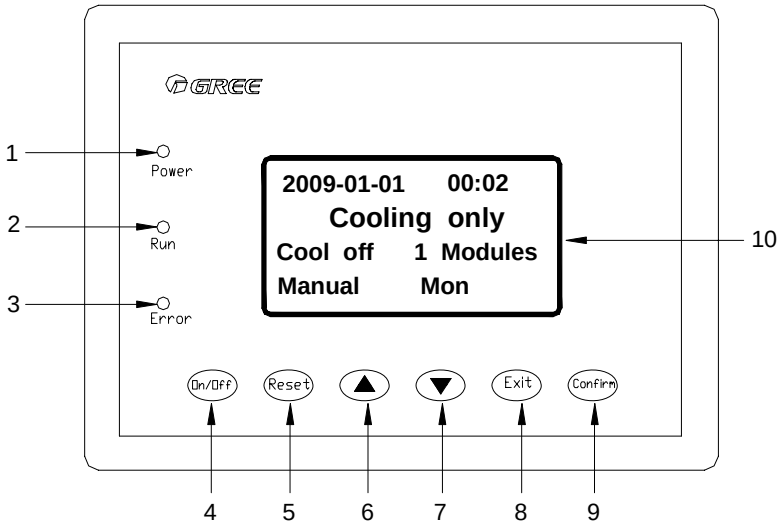
Water pump is open while the unit is on and it is closed after the compressor stops for some min. Water flow switch protection means water pump is closed while the compressor stops. Refer to 2.3 for control of water pump in auto antifreezing operation.

3 WIRED REMOTE CONTROLLER

3.1 Function

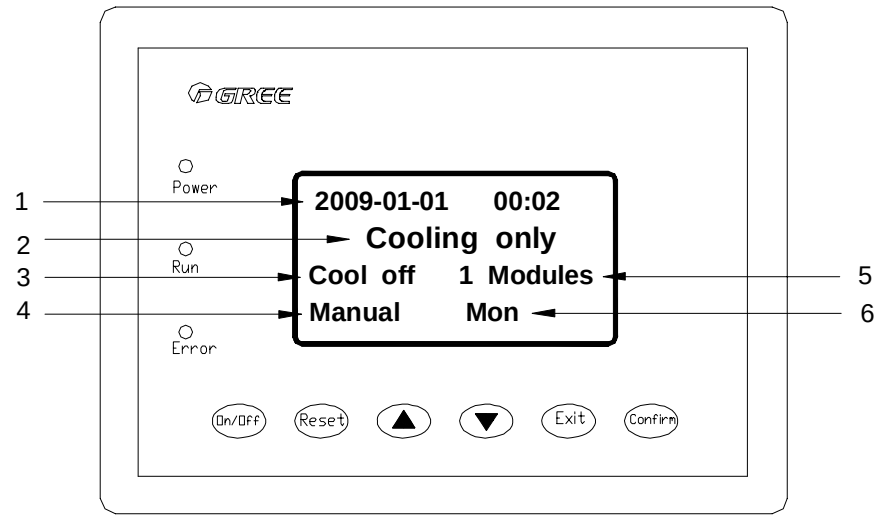
One LCD can be used to control 1～8 sets of chiller in one system, it is used to display control menu, accept and display all the parameter which is sent by main board, set the parameter, and send the setting parameter to main board.

3.2 Operation View



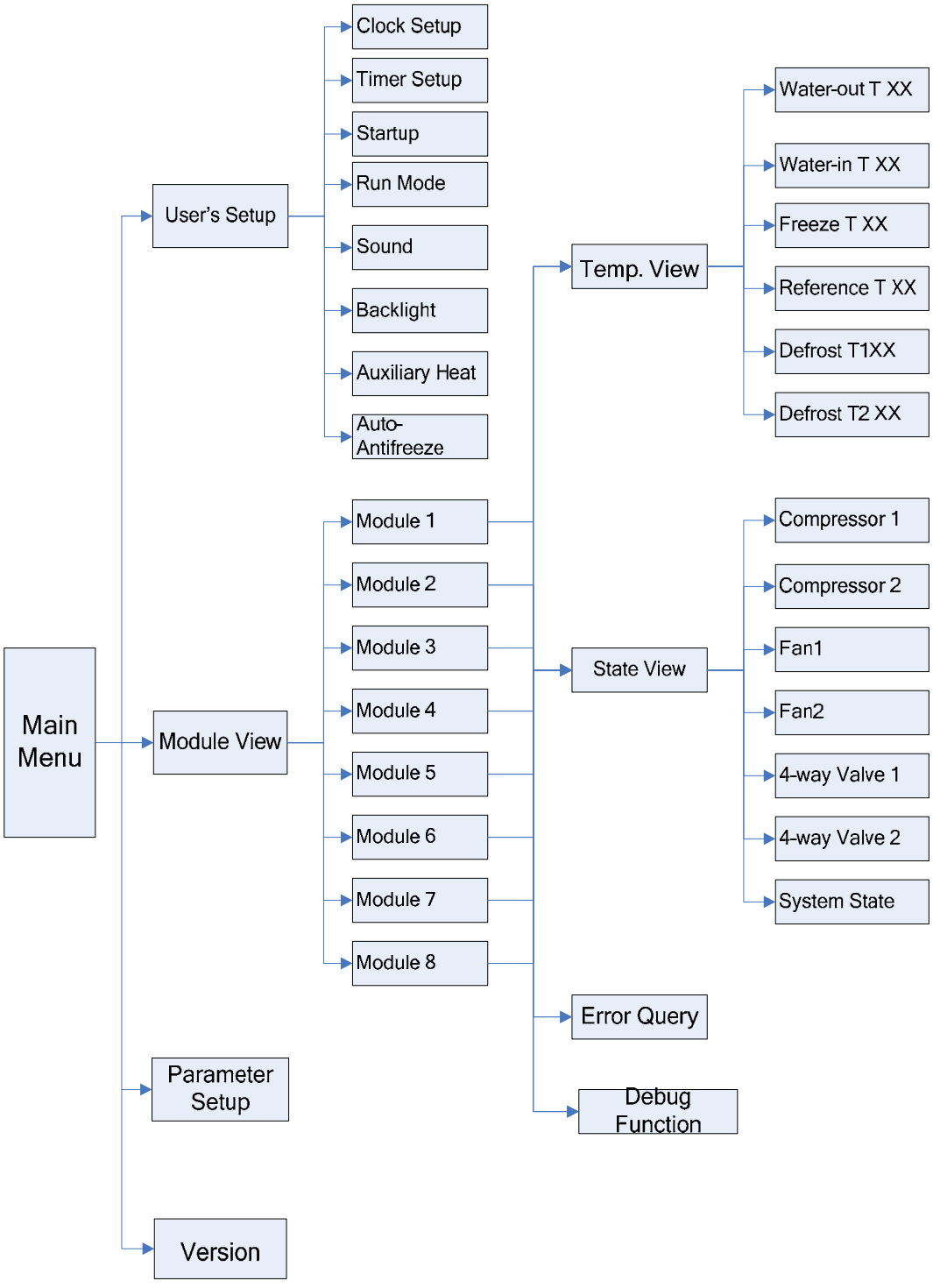
NO.	Name	Function description
1	**Power Indicator （Green）**	If the power of the display board is on, Power Indicator will be light, or else it is off.
2	**Run Indicator （Green）**，	If the display board is started, Run Indicator will be lighted, or else it won't.
3	**Error Indicator （Red）**，	If the error happens, Error Indicator will be light, or else it won't.
4	**On/Off Button**	Switch on/off the control units. In the standby state, press this button (for 3 sec) to start the unit, or press it (for 3 sec.) to stop the unit in the operating state.
5	**Reset Button**	Pressing this button (for 3sec.), the screen will show full-screen content and the error show will be eliminated, at the same time the system will check the error again.
6	**▲ Button**	When selecting the menu, press this button to move a cursor upward or left. When modifying the data, press this button to add the numerical value.
7	**▼ Button**	When selecting the menu, press this button to move a cursor downward or right. When modifying the data, press this button to decrease the numerical value.
8	**Exit Button**	Press this button to return to the previous menu.
9	**Confirm Button**	When selecting the menu, press this button to confirm the selection and go into the next menu; When modifying the parameters, press this button to confirm the parameter and move the cursor.
10	**LCD**	The area for the information display.

3.3 Display View



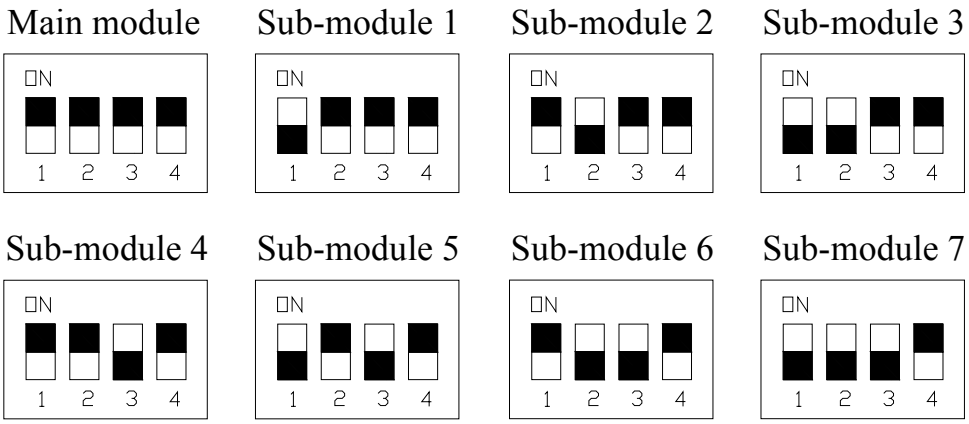
No.	Display type	Content description
1	Date	Display the current data
2	Unit name	Display the name of the unit
3	Run state	Display the current state of the unit, such as running or off
4	On/off mode	Display the mode of the unit on or off, such as manual or timer
5	Module number	Display the module number of the whole unit, it would be from 0 to 8
6	Week	Display the week at the moment, such as mon.

3.4 Menu Structure of Controller



3.5 Sketch map of DIP switch

Address DIP switches setting is shown as below (Address DIP switch1, 2 and 3 are to set the main module and sub-module)



Note： “ ■”on the address switch indicates the actual location of code switch.

Warning：The setting of the address DIP switch should be done while the units are powered off. If power on, adjusting the address DIP switch is prohibited.

INSTALLATION

INSTALLATION

1 BEFORE INSTALLATION

1) Please check the attached documents of unit and accessories according to package list.
2) Check the model and specification according to attached documents.
3) Check the unit for damage and accessories.
4) Check the charge refrigerant for leakage.

If there is any problem, please contact the local service center.

2 INSTALLATION SITE

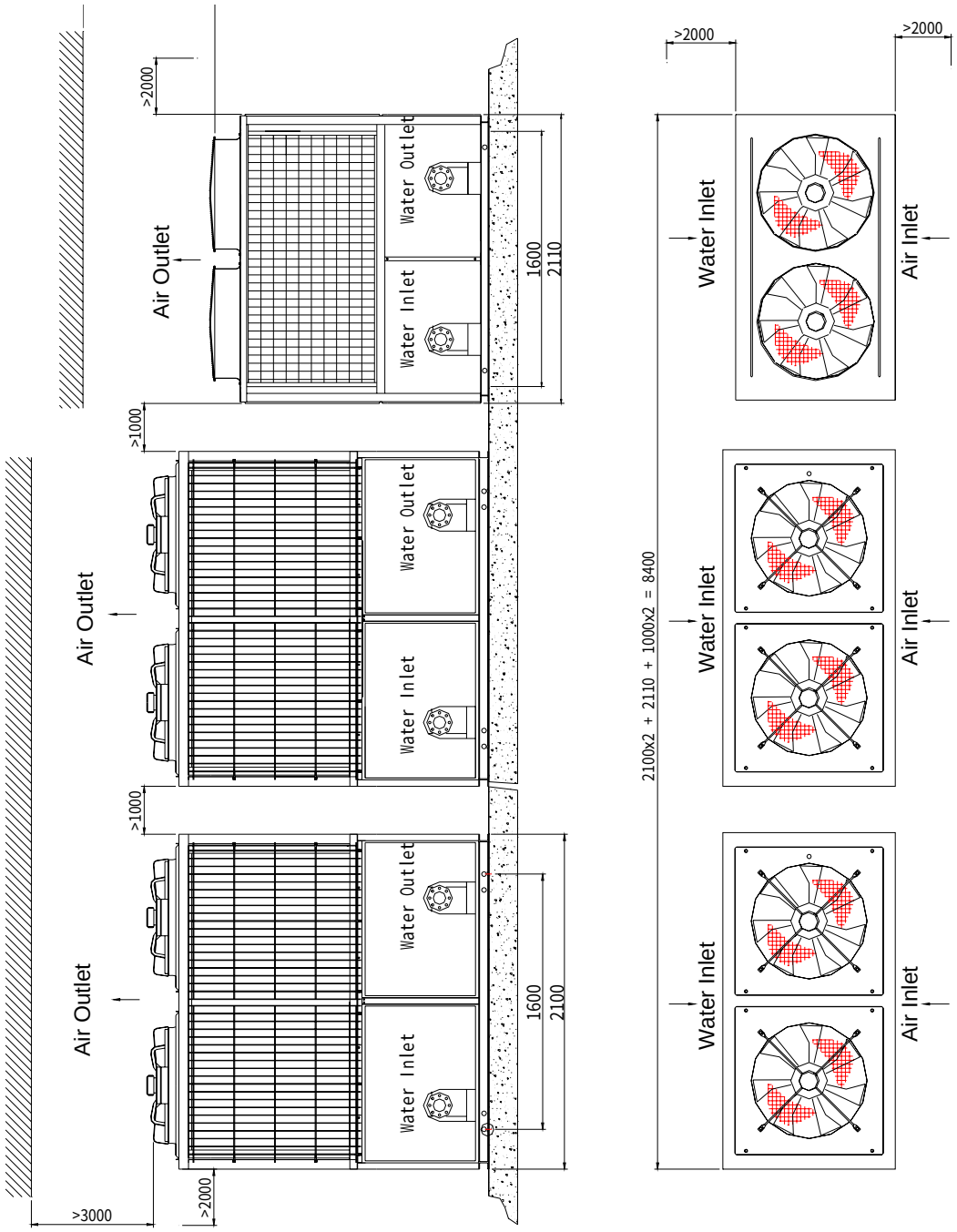
1) The outside place where there is enough fresh air and bearing of foundation shall also be considered;
2) Enough space for air return and maintenance of equipments;
3) No obstacles above the unit;
4) Drainage ditch reserved for the unit;

3 CAUTIONS FOR INSTALLATION

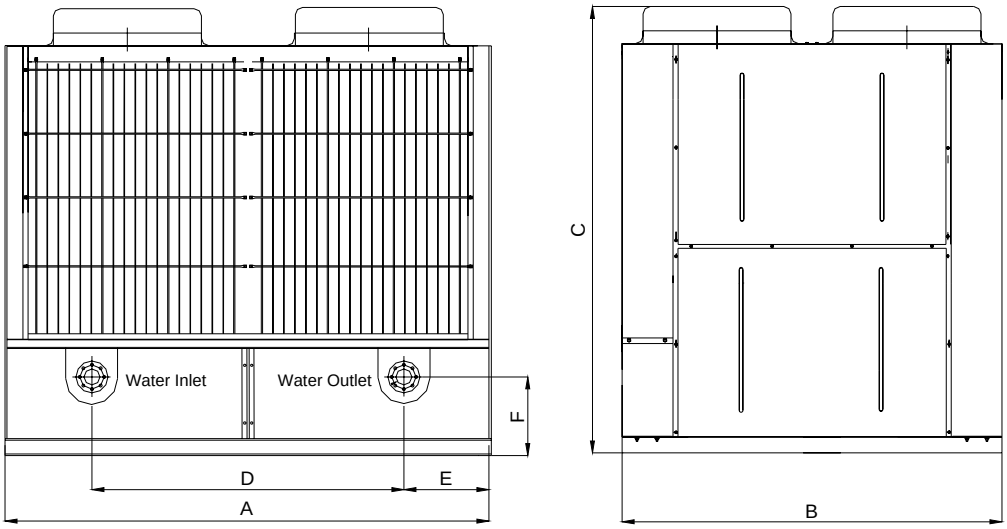
1) Had not better install the unit in the room. If necessary, the distance between air vent and ceiling shall at least be 3m and enough air flow volume and ventilating systems shall be ensured.
2) Refrigerant should be non-flammable and non-toxic. Because of high density of it, the room placing the unit must be ventilated.
3) Once leakage of refrigerant, turn off the unit immediately and contact service personnel in time. Open fire at field is prohibited to avoid toxic gas resulted from contact of it and the refrigerant.

4 MACHINE FOOTPRINT

Put rubber shock pad under each of the modules on the ground or the rooftop and then fix it with bolts. Or put the units line by line on two pieces of box iron or I iron and fix with bolts. The distance between adjacent modules should be ＞100 cm.


>2000
Air Outlet
Water Outlet
Water Inlet
1600
2110
>1000
Air Outlet
Water Outlet
Water Inlet
>1000
Air Outlet
Water Outlet
Water Inlet
1600
2100
>3000
>2000
>2000
>2000
Water Inlet
Air Inlet
Water Inlet
Air Inlet
Water Inlet
Air Inlet
2100x2 + 2110 + 1000x2 = 8400

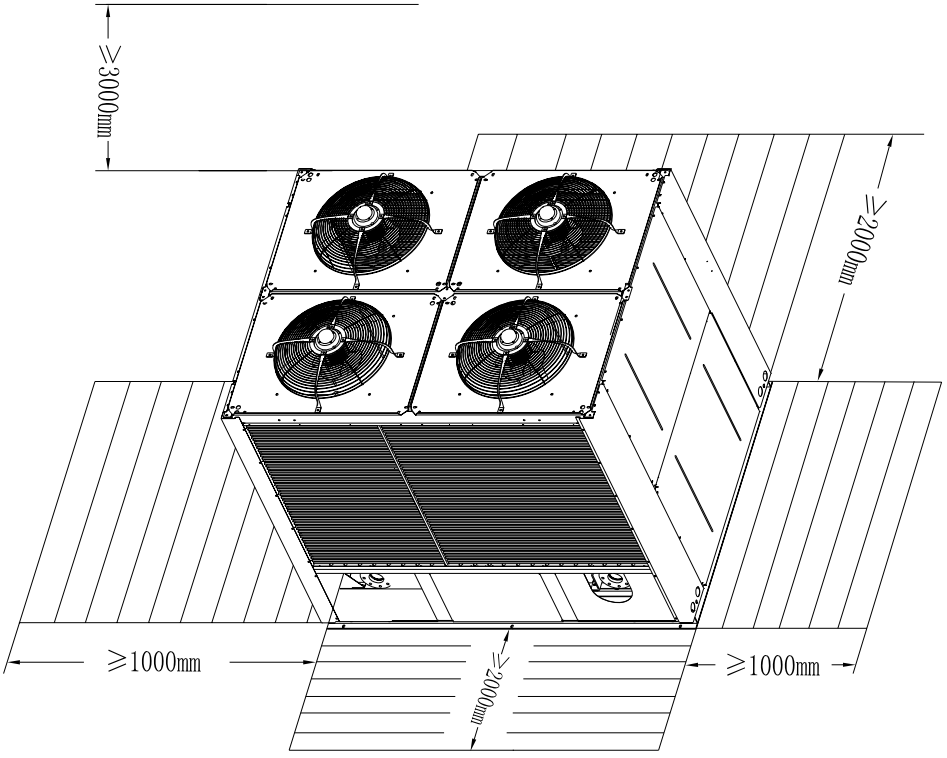
5 DIMENSION DATA



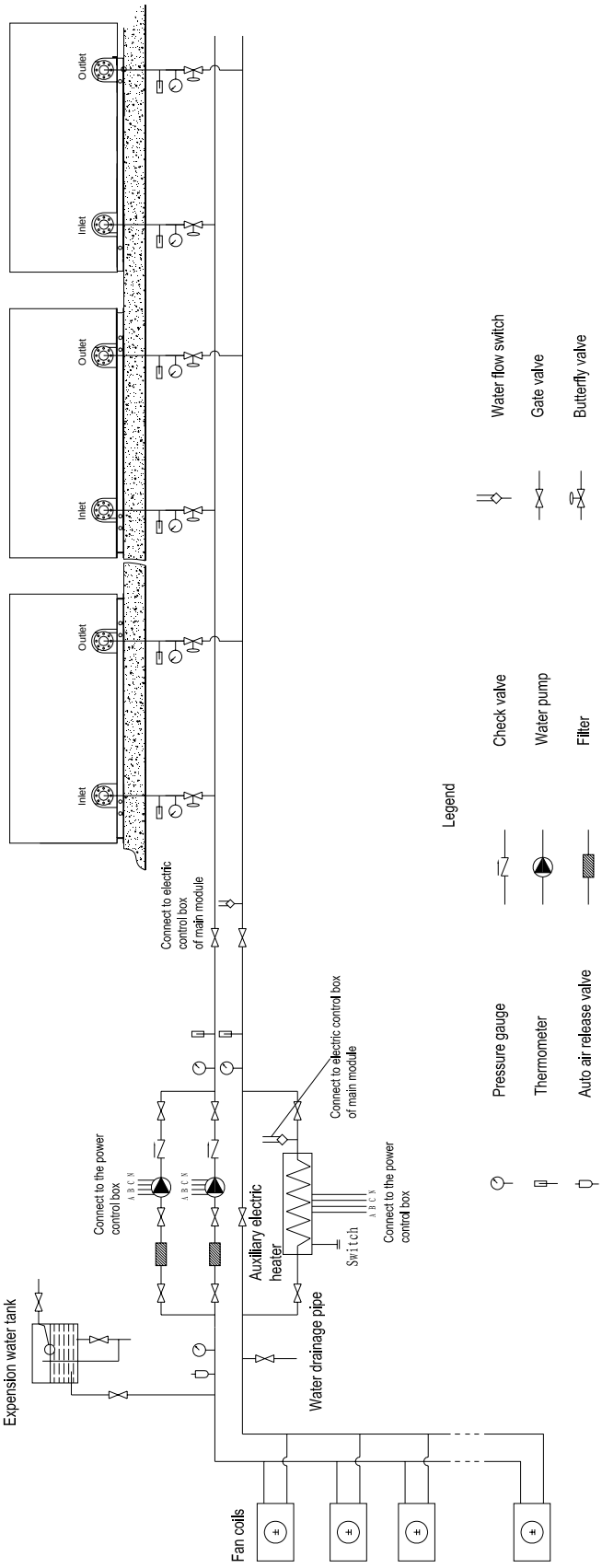
Unit:mm

Model	A	B	C	D	E	F
LSQW(R)F65M/N-M	2110	1100	2140	1300	400	320
LSQW(R)F80M/N-M	2110	1100	2140	1300	400	320
LSQW(R)F130M/N-M	2410	1900	2240	1560	425	383

6 INSTALLATION CLEARANCE DATA



7 TYPICAL WATER PIPING DIAGRAM



8 ANTIFREEZE

The units can operate with a leaving chilled fluid temperature from of 42°F to 60°F(5°C～16°C).A glycol solution is required when leaving chilled fluid temperature is below 4.5°C. The use of glycol will reduce the performance of the unit depending on concentration.

% by Weight	10	20	30	40	50
Freezing Point°C（°F）	-3.3(26)	-7.8(18)	-13.9(7)	-21.7(-7)	-33.3(-29)
Ambient Temperature°C（°F）	8.3(47)	-1.7(29)	-6.7(20)	-16.7(2)	-26.7(-16)
Cooling Capacity Correction Factor	0.998	0.993	0.987	0.980	0.973
Water Flow Correction Factor	1.036	1.060	1.092	1.132	1.182
Pressure Drop Correction Factor	1.07	1.10	1.18	1.24	1.30

9 ELECTRIC WIRING WORK

9.1 Wiring Principle

1）General

- All leading wires, joints of them, equipments and wirings at field must accord with various applicable regulations and requirements.
- All wiring work at field must be performed by the certificated personnel.
- Wiring work must be performed after cutting off power supply.
- The installing personnel shall be responsible for any damage resulted from incorrect connection of external wirings.
- Warning---copper leading wire must be used.

2）Connect power cord into electric box of unit

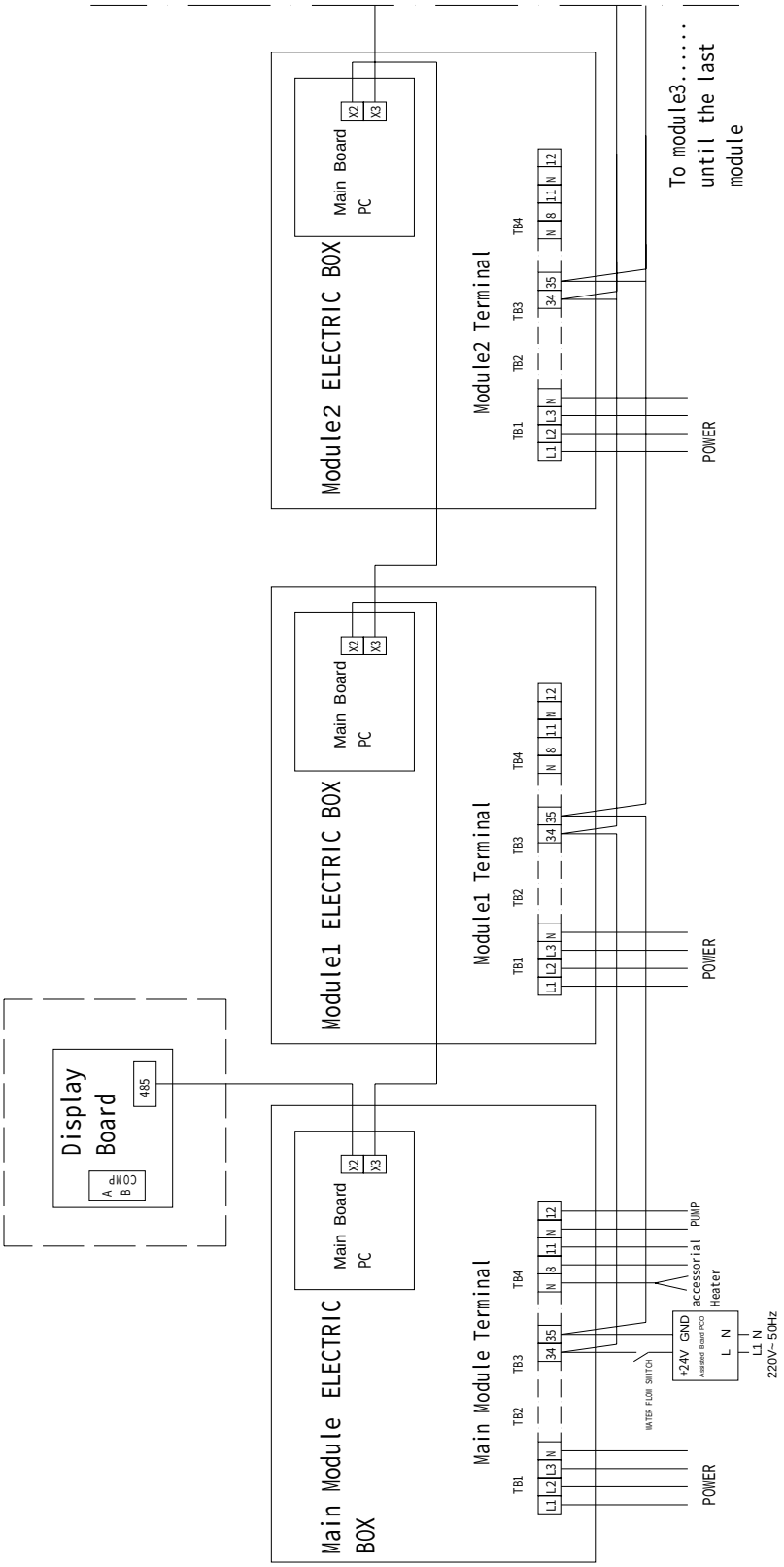
- Circuit breaker must be installed in the external electric cabinet of unit to cut off power of the electric box in the unit.
- The power cord should be laid out through the trunking, spool or cable trench.
- Rubber or plastic must be used for protection of power cord connected into electric box in the unit to avoid scratch by sheet metal edge.
- The power cord close to electric cabinet of unit must be fixed reliably to protect power terminal of electric box.

- Reliable earthing must be ensured.

3）Control Connection Wire

- Control leading wire at site should be 1mm^2 at least.
- The signal connected with water flow switch is 12V D.C light-current signal, so never wire it together with the leading wire at 50V or above in parallel. If unavoidable, the distance between heavy current and light current signals must be kept 150mm or above.
- Chilled water pump is equipped with the electric box of unit. Control signal （220V AC；capacity 5A）of E-heater can drive chilled water pump and AC contactor of E-heater. Never make the motor of chilled water pump and E-heater directly driven by the signal.
- Keep some allowance of control wire in the unit. Never tie the excess wire into the electric box of the unit.

9.2 Electric Wiring Design

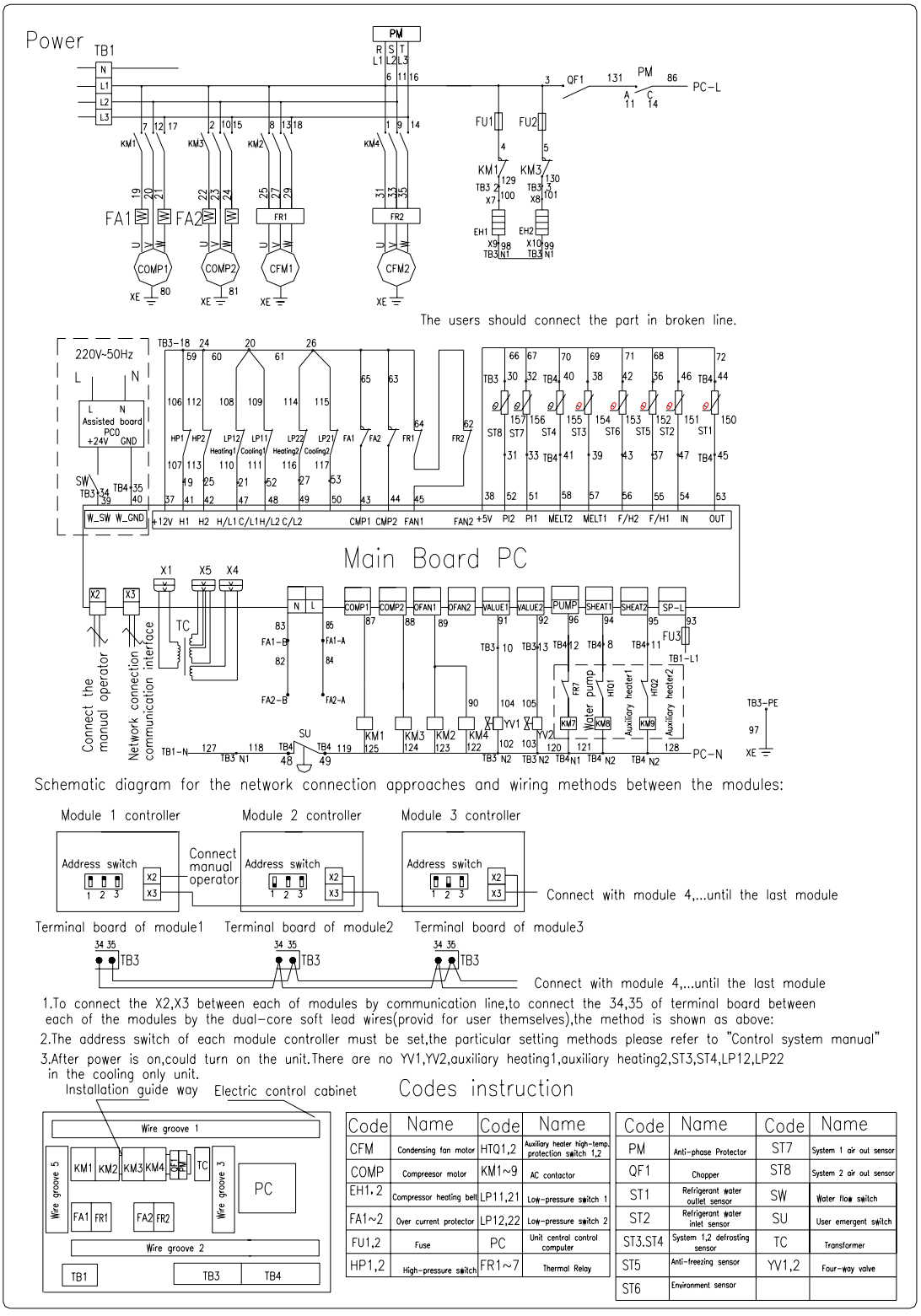


Note：

1) use the 4 cores communication wires to connect each modules between X2,X3.use a 2 cores （2×1mm^2） signal wires to connect the terminal 34,35 between each modules. Refer to the diagram shown above.
2) use a 2 cores（2×1mm2） signal wires to connect the Water flow switch with the Main module's terminal 34;35. Refer to the diagram shown above.
3) use a 4 cores（4×10mm2~35mm2） wires to connect each module terminal TB1 L1,L2,L3,N together. Refer to the diagram shown above.
4) use a 2 cores（2×1mm2） wires to connect the pump relay with the Main module terminalTB4-12;N together. Refer to the diagram shown above.
5) use two 2 cores（2×1mm2） wires to connect the accessorial heater 1 and 2 relay with the Main module terminalTB4-（N.8）;(N.11) respectively. Refer to the diagram shown above.

9.3 WIRING DIAGRAM

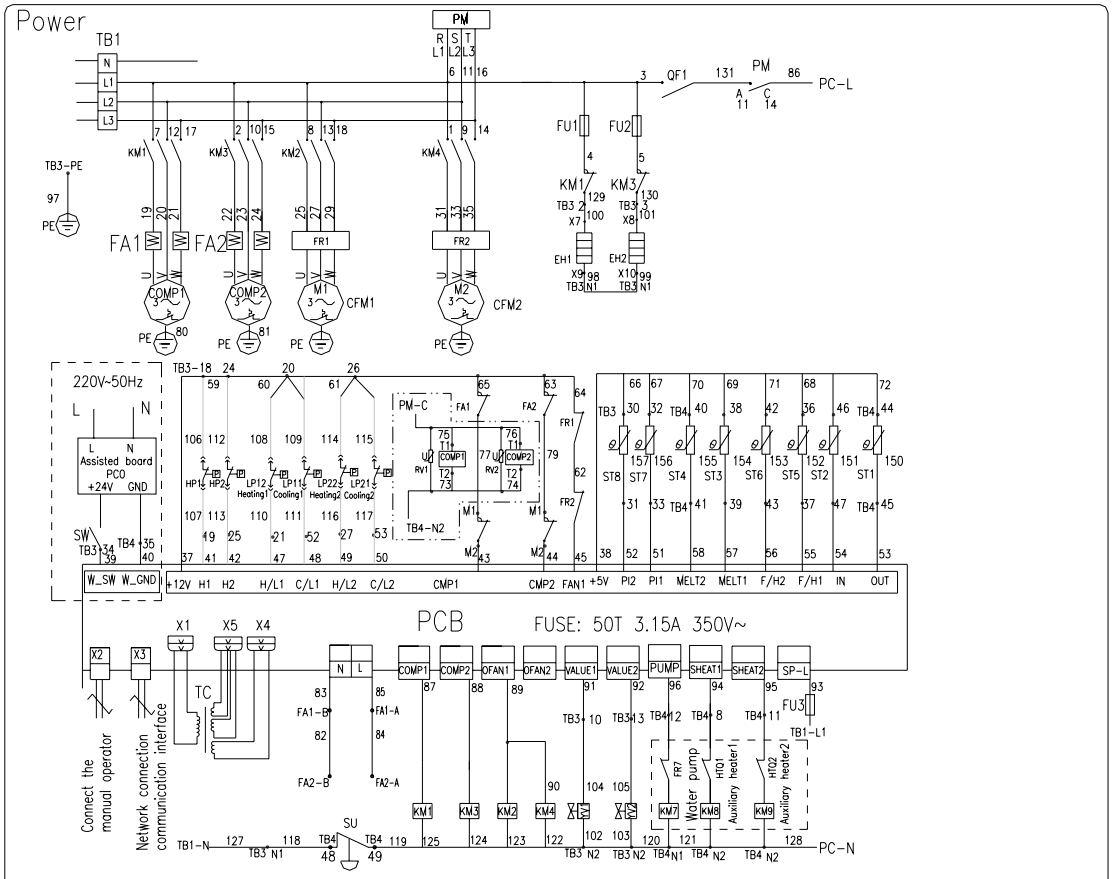
LSQW(R)F65M/N-M



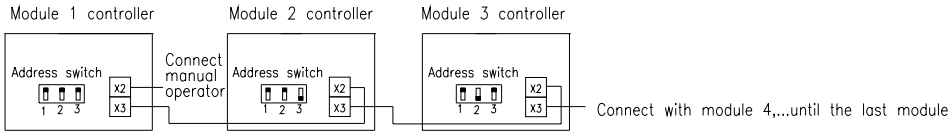
Code	Name	Code	Name
CFM	Condensing fan motor	HTQ1,2	Auxiliary heater high-temp. protection switch 1,2
COMP	Compreesor motor	KM1~9	AC contactor
EH1.2	Compressor heating belt	LP11,21	Low-pressure switch 1
FA1~2	Over current protector	LP12,22	Low-pressure switch 2
FU1,2	Fuse	PC	Unit central control computer
HP1,2	High-pressure switch	FR1~7	Thermal Relay

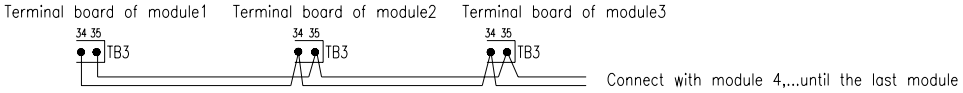
Code	Name	Code	Name
PM	Anti-phase Protector	ST7	System 1 air out sensor
QF1	Chopper	ST8	System 2 air out sensor
ST1	Refrigerant water outlet sensor	SW	Water flow switch
ST2	Refrigerant water inlet sensor	SU	User emergent switch
ST3.ST4	System 1,2 defrosting sensor	TC	Transformer
ST5	Anti-freezing sensor	YV1,2	Four-way valve
ST6	Environment sensor		

LSQW(R)F80M/N-M



Schematic diagram for the network connection approaches and wiring methods between the modules:




Terminal board of module1
Terminal board of module2
Terminal board of module3
TB3
Connect with module 4,...until the last module

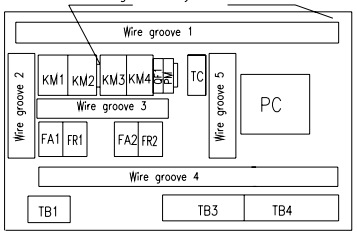
1.To connect the X2,X3 between each of modules by communication line,to connect the 34,35 of terminal board between each of the modules by the dual-core soft lead wires(provid for user themselves),the method is shown as above:

2.The address switch of each module controller must be set,the particular setting methods please refer to "Control system manual"

3.After power is on,could turn on the unit.There are no YV1,YV2,auxiliary heating1,auxiliary heating2,ST3,ST4,LP12,LP22 in the cooling only unit.

4.There aren't the elements and the wiring in [ ] when using the compressor of brand Danfoss

Installation guide way Electric control cabinet

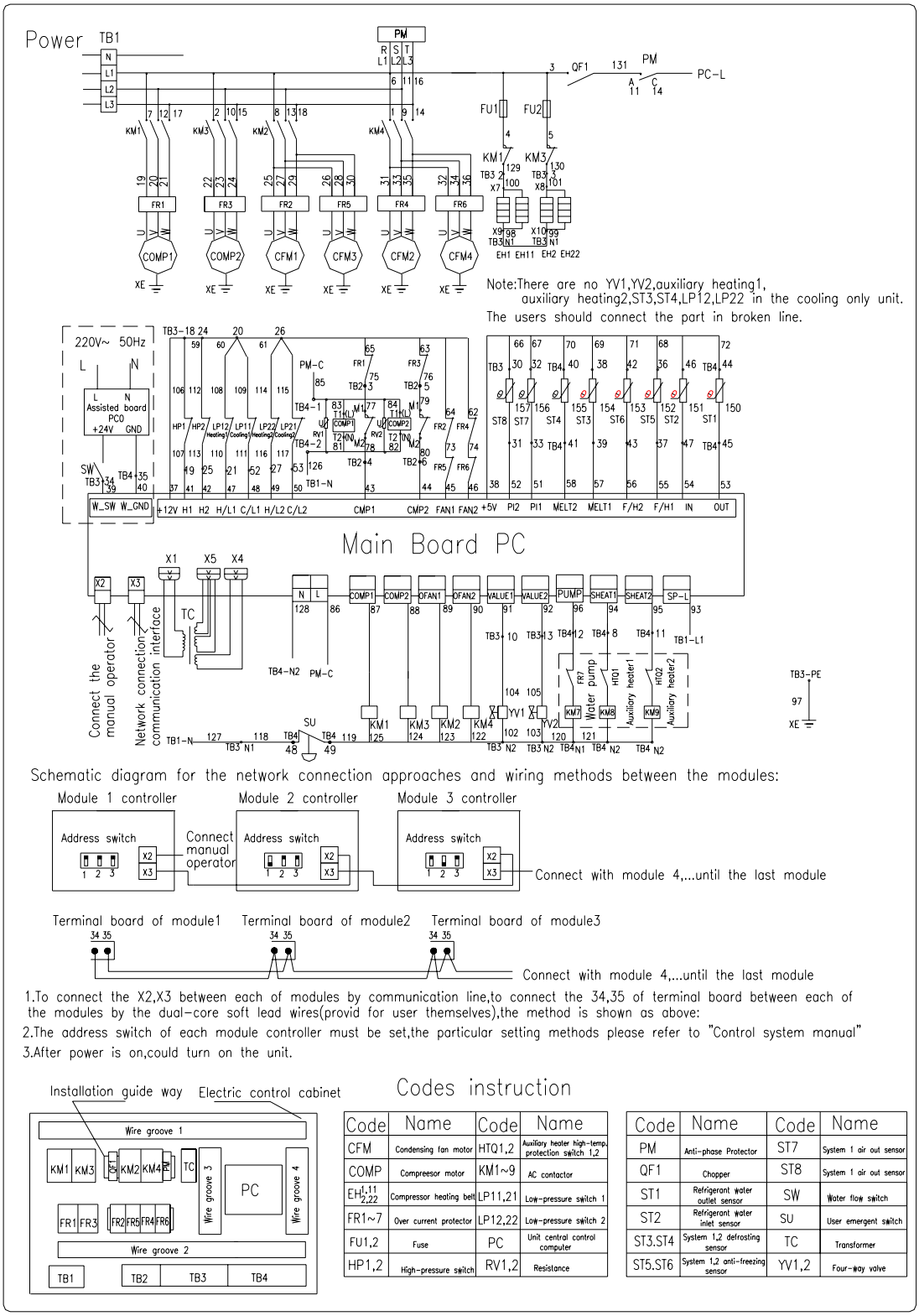


Codes instruction

Code	Name	Code	Name
M	Condensing fan motor	HTQ1,2	Auxiliary heater high-temp. protection switch 1,2
COMP	Compreesor motor	KM1~9	AC contactor
EH1、2	Compressor heating belt	LP11,21	Low-pressure switch 1
FA1~2	Over current protector	LP12,22	Low-pressure switch 2
FU1~3	Fuse	PC	Unit central control computer
HP1,2	High-pressure switch	FR1~2	Thermal Relay

Code	Name	Code	Name
PM	Anti-phase Protector	ST7	System 1 air out sensor
QF1	Chopper	ST8	System 2 air out sensor
ST1	Refrigerant water outlet sensor	SW	Water flow switch
ST2	Refrigerant water inlet sensor	SU	User emergent switch
ST3.ST4	System 1,2 defrosting sensor	TC	Transformer
ST5	Anti-freezing sensor 1 (Freeze/Superheat temperature)	YV1,2	Four-way valve
ST6	Anti-freezing sensor2 (Reference Temperature)		

LSQW(R)F130M/N-M



Code	Name	Code	Name
CFM	Condensing fan motor	HTQ1,2	Auxiliary heater high-temp. protection switch 1,2
COMP	Compressor motor	KM1~9	AC contactor
EH1,11 2,22	Compressor heating belt	LP11,21	Low-pressure switch 1
FR1~7	Over current protector	LP12,22	Low-pressure switch 2
FU1,2	Fuse	PC	Unit central control computer
HP1,2	High-pressure switch	RV1,2	Resistance

Code	Name	Code	Name
PM	Anti-phase Protector	ST7	System 1 air out sensor
QF1	Chopper	ST8	System 1 air out sensor
ST1	Refrigerant water outlet sensor	SW	Water flow switch
ST2	Refrigerant water inlet sensor	SU	User emergent switch
ST3.ST4	System 1,2 defrosting sensor	TC	Transformer
ST5.ST6	System 1,2 anti-freezing sensor	YV1,2	Four-way valve

Note:This wiring diagram is just for your information, and please refers to the diagram stuck to the unit during the actual wiring.

MAINTENANCE

MAINTENANCE

1 TROUBLE TABLE

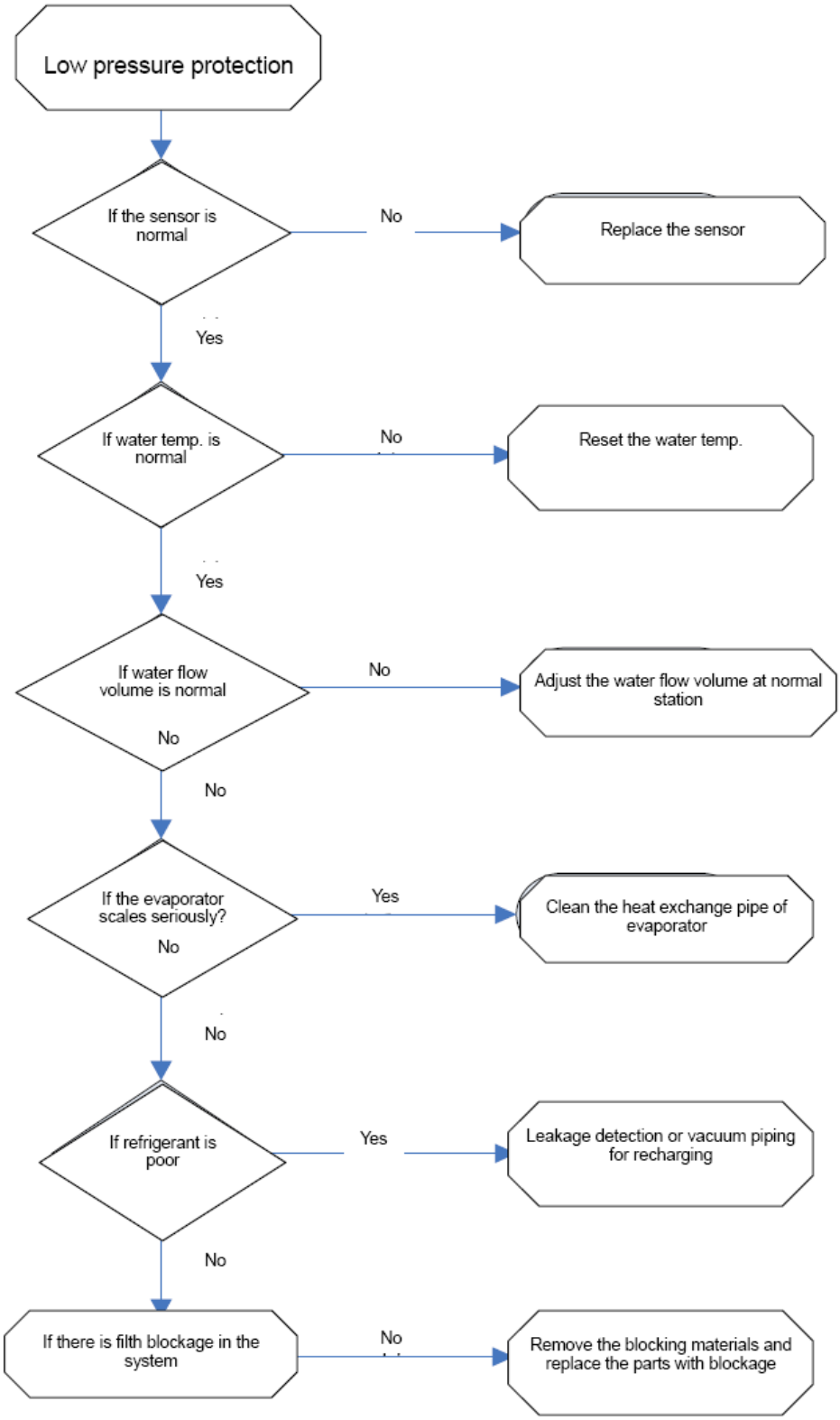
Error Display	Description	Signal Source	Control Logic
Hi pressure 1 of Comp.	High pressure protection of compressor 1	High pressure switch of compressor 1	High pressure switch acts when high pressure reaches 3.0MPa.If both of the compressors are off, the fan will delay to stop. For 4-fan system: if the compressor of a certain system is off, the corresponding fan will delay to stop. Error indicator on display board will light and relative mark will also be displayed. It must be manually cleared to resume running of the unit.
Hi pressure 2 of Comp.	High pressure protection of compressor 2	High pressure switch of compressor 2	
Low pressure 1 of Comp.	Low pressure protection of compressor 1	Low pressure switch of compressor 1	Error code is displayed and can not be automatically resumed. If error code disappears after reset, the malfunction is cleared.
Low pressure 2 of Comp.	Low pressure protection of compressor 2	Low pressure switch of compressor 2	
Overload of Comp.1	Overload protection of compressor 1	Overload protector of compressor 1	If overload protection of compressor is detected, the relative compressor will immediately be stopped and then the fan. If compressor overload protection is detected 3 times successively, error code will be displayed and it can not automatically resume. After reset, the malfunction will be cleared if the problem disappears.
Overload of Comp.2	Overload protection of compressor 2	Overload protector of compressor 2	
Overcurrent of fan 1	Overcurrent protection of fan 1	Overcurrent protector of fan	If fan overload protection is detected, all compressors and fans should be immediately stopped. If it resumes after 3min, running of unit will automatically resume. If fan overload protection is detected 3 times successively, error code will be displayed and it can not automatically resume. After reset, the malfunction will be cleared if the problem disappears.
Inlet water temp. sensor	Inlet water temp. sensor protection	Inlet water temp. sensor	If inlet water temp. sensor malfunction, the unit will run as usual and display error code.
Outlet water temp. sensor	Outlet water temp. sensor protection	Outlet water temp. sensor	If short circuit or open circuit of outlet temp. sensor malfunction, error code will be displayed and all loads will be stopped. The unit will resume running if the problem is solved.

Defrost temp. sensor 1	Defrosting temp. sensor 1 protection	Defrosting temp. sensor	In case of open circuit or short circuit of defrosting temp. sensor, error code will be displayed and all loads will be stopped. The unit will resume running if the problem is solved.
Defrost temp. sensor 2	Defrosting temp. sensor 2 protection		
High discharge temp. 1	High discharge temp. protection of compressor 1	Discharge temp. sensor of system 1	In case of open or short circuit of discharge temp. sensor, error code will be displayed and all loads will be stopped. The unit will resume running if the problem is solved.
High discharge temp. 2	High discharge temp. protection of compressor 2	Discharge temp. sensor of system 2	

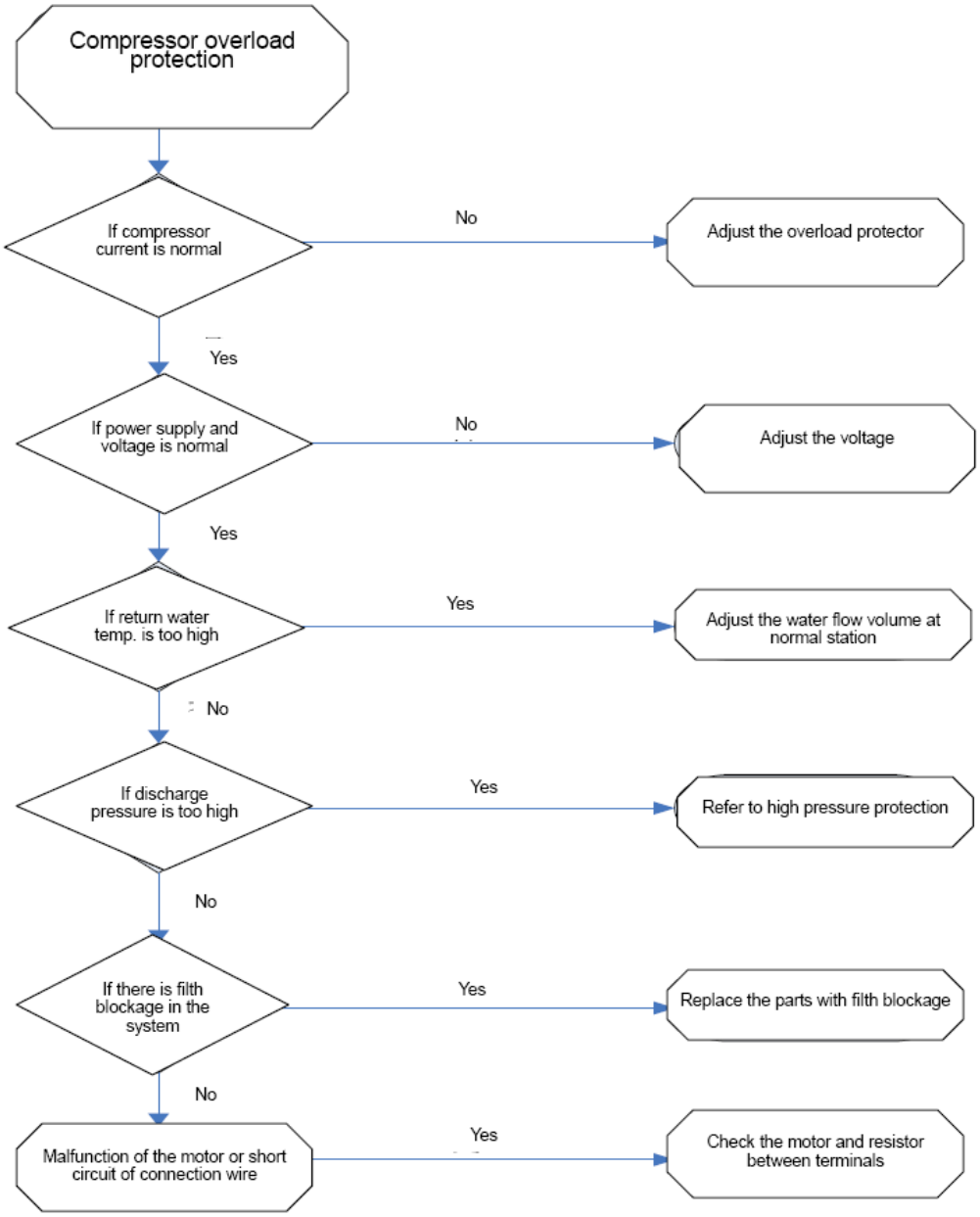
2 FLOW CHART OF TROUBLESHOOTING

1）High pressure protection

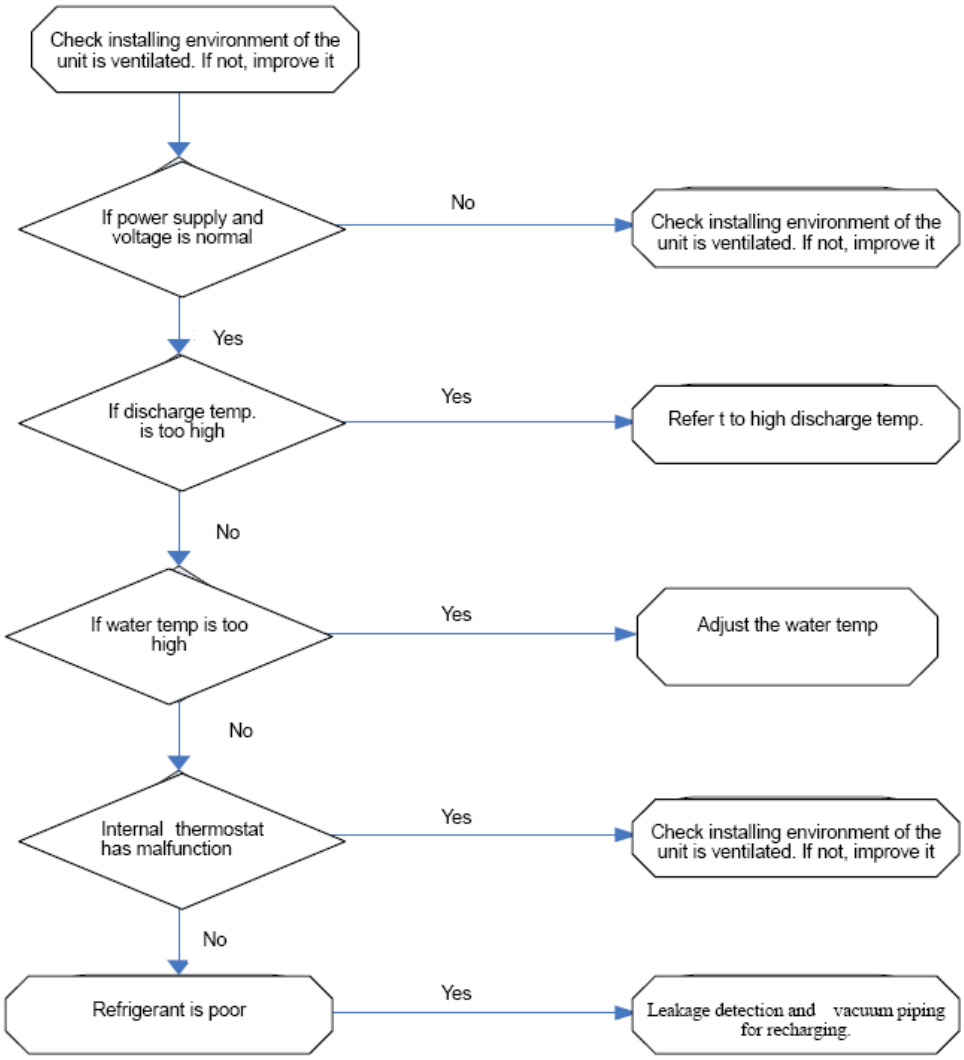
2）Low pressure protection



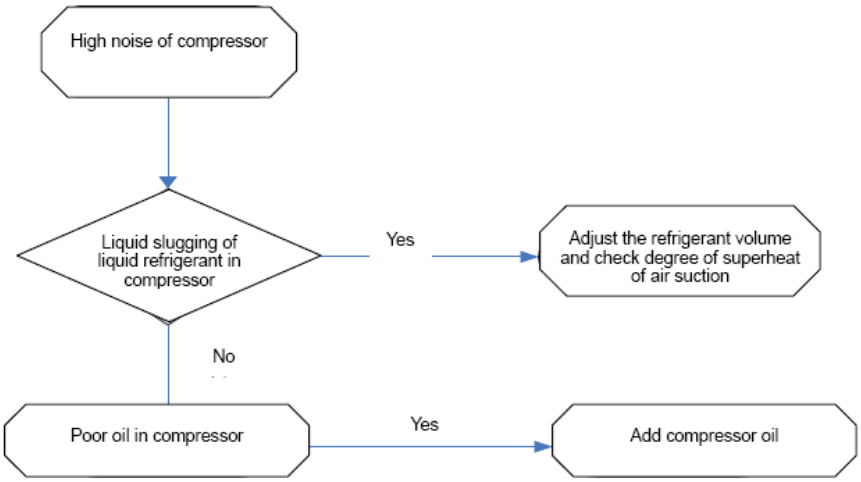
3）Compressor Overload Protection



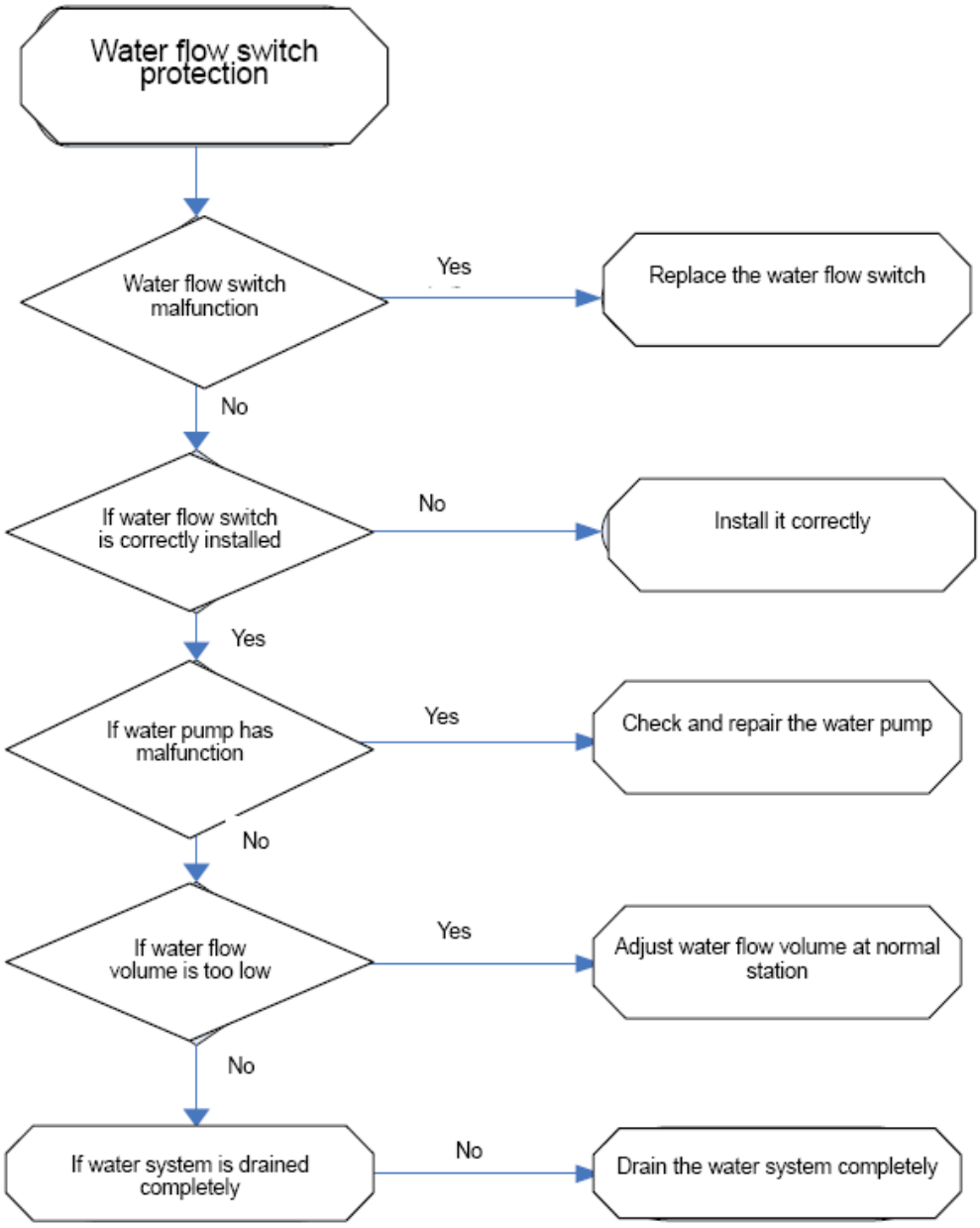
4）Internal Protection of Compressor

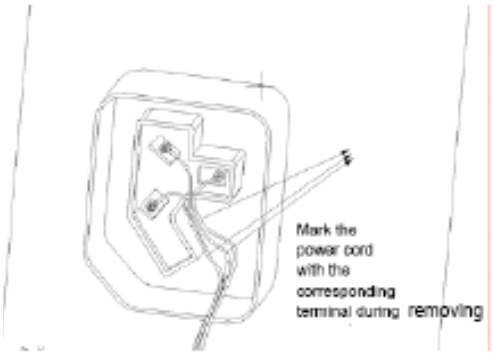
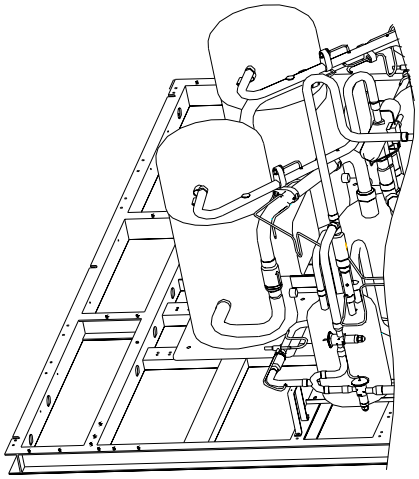
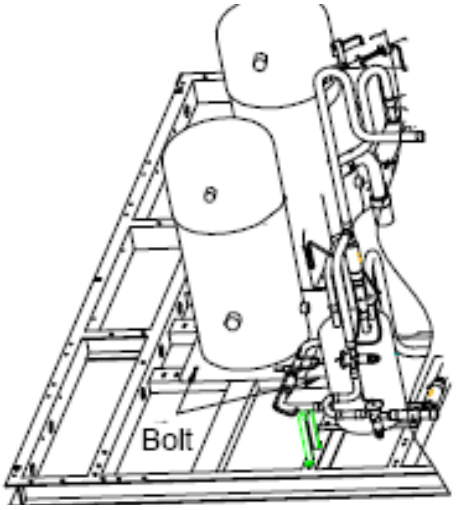

Check installing environment of the unit is ventilated. If not, improve it
If power supply and voltage is normal
No
Check installing environment of the unit is ventilated. If not, improve it
Yes
If discharge temp. is too high
Yes
Refer t to high discharge temp.
No
If water temp is too high
Yes
Adjust the water temp
No
Internal thermostat has malfunction
Yes
Check installing environment of the unit is ventilated. If not, improve it
No
Refrigerant is poor
Yes
Leakage detection and vacuum piping for recharging.

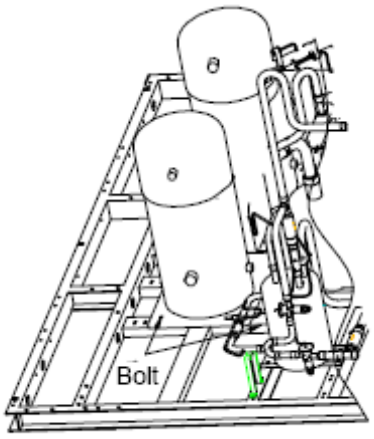
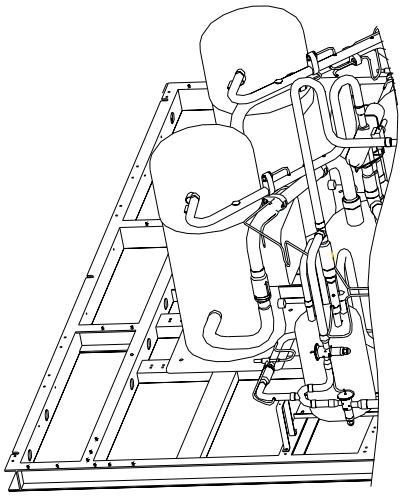
5）High Noise of Compressor

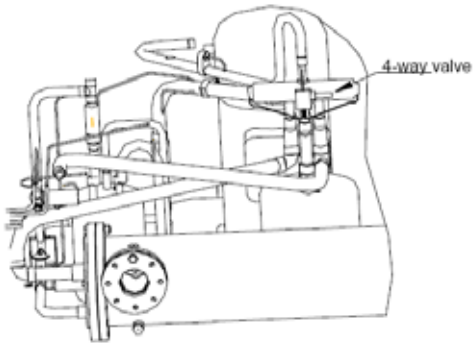
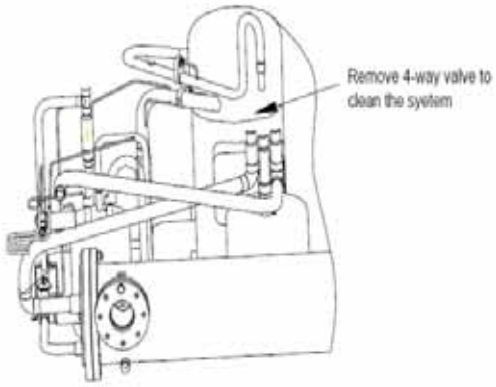
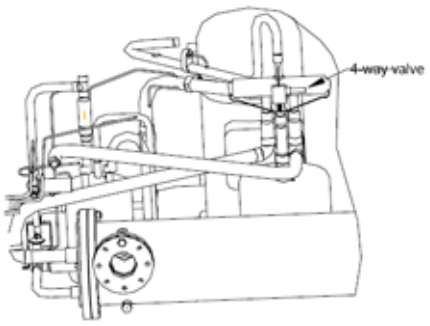

High noise of compressor
Liquid slugging of liquid refrigerant in compressor
Yes
Adjust the refrigerant volume and check degree of superheat of air suction
No
Poor oil in compressor
Yes
Add compressor oil

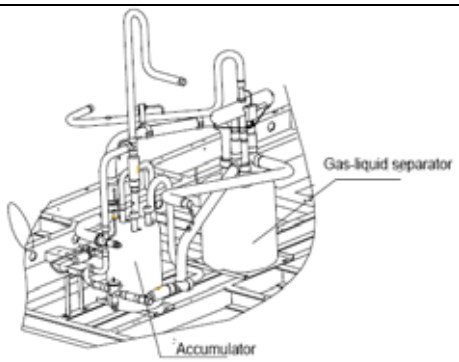
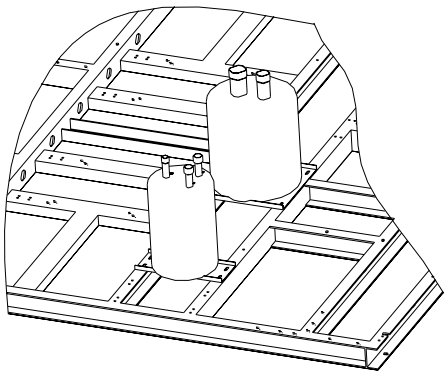
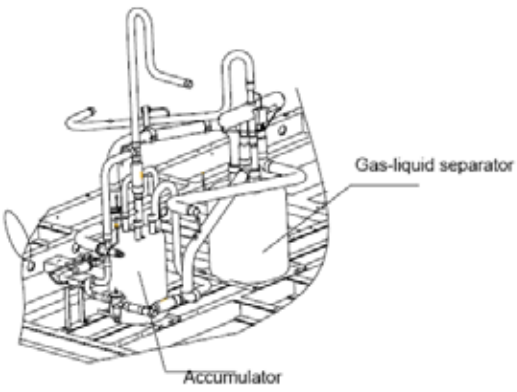
6）Water flow switch protection

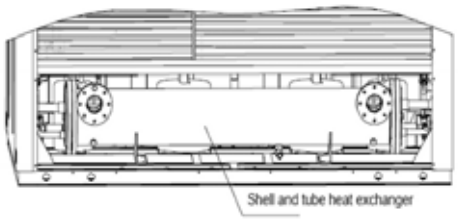
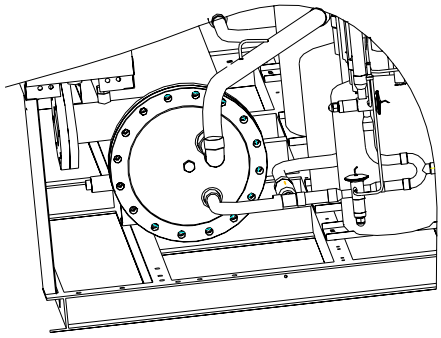
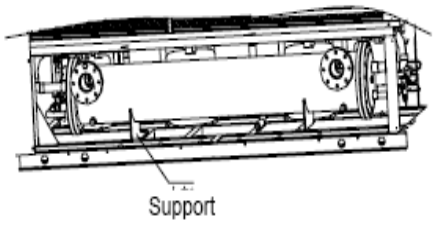
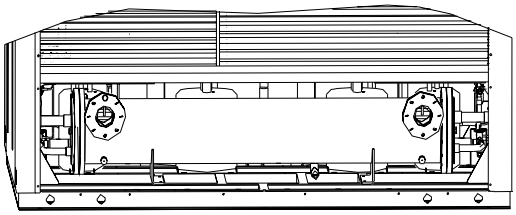


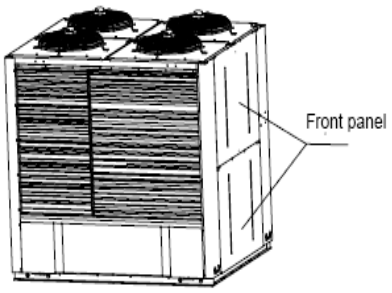
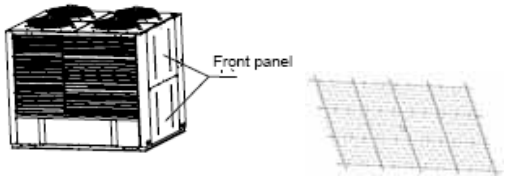
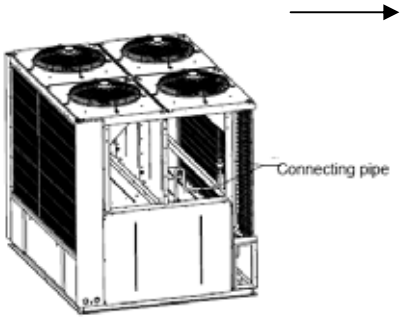
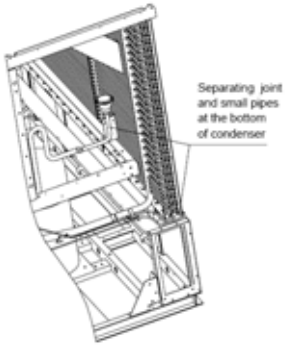
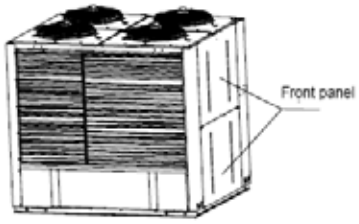
Removal and Installation of Compressor		
Remark: Before removing the compressor, make sure that there is no refrigerant inside the pipe system and that the power has been cut off.		
Step	Illustration	Handling Instruction
1.Remove the power cord		● Use screwdriver to loosen the screws fixing the power cable. ● Pull out the power cable. ● If compressor has e-heating tape, it should also be removed. Note: When removing the power cable, please mark the power cable color and corresponding terminal, thus to avoid error during reinstallation.
2. Remove the nuts fixing the compressor		● Screw off the screws fixing the compressor with shifting spanner or box spanner. ● The removed screws should be put together in case of lost.
3.Disconnect the pipe that connects to the compressor		● During welding the pipe, take care to finish it quickly in case of superburning. ● Do not damage the compresser in case analisis in the future.

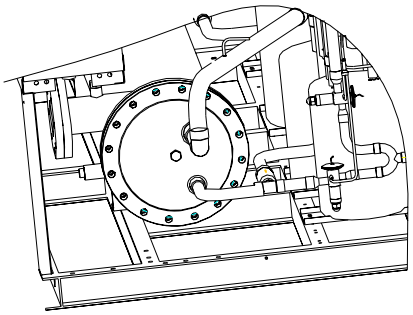
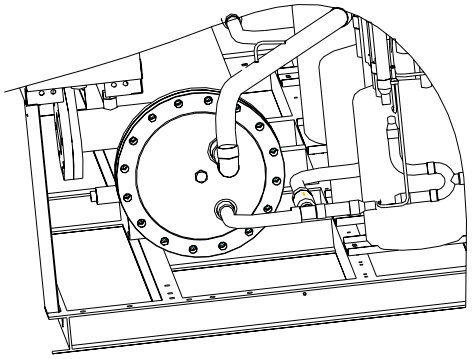
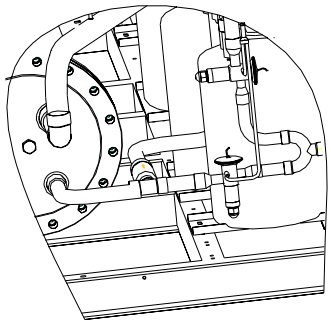
4.Remove the compressor, and fix a new compressor to chassis.		● Do not damage the rubber blanket when removing the compressor; ● In case of intake of moisture, the compressor orifice should be sealed. ● Place the nwe compressor on the rubber blanket on which steel bushing is put. ● Tighten the screws unitl it reach the steel bushing.
5.Connect the suction and exhaust pipe of compressor to the system pipeline; connect the power cord and check whether the compressor runs normally		● Connect the suction and exhaust pipe to the compressor and weld it. Nitrogen must be charged when welding. ● After welding, charge high-pressure nitrogen to test leak. ● Energize the unit and crawl the AC contactor of the compressor manually to start up the compressor. 2~3 sec is OK. ● During inversion of the compressor, there will be harsh noise.

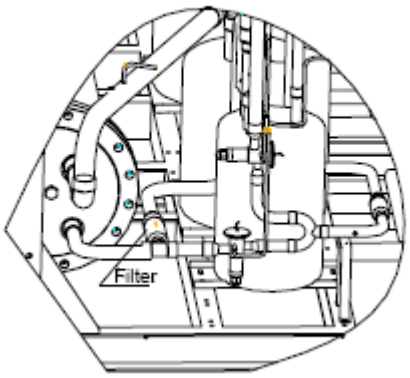
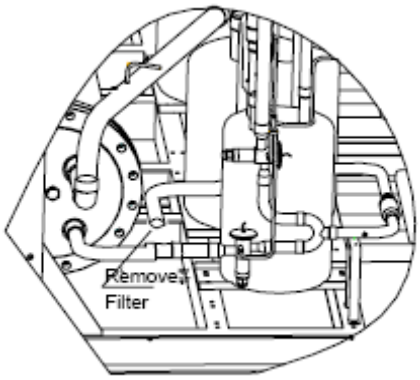
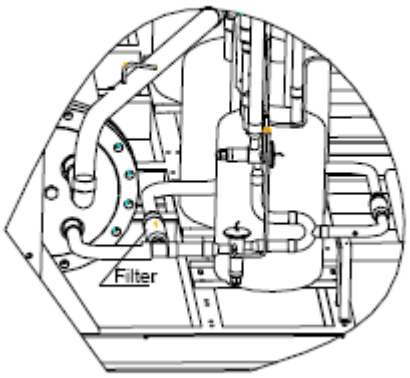
Disassembly and Assembly of 4-way valve		
Remarks: Before removing the 4-way valve, cut off the power and reclaim the refrigerant;		
Step	Illustration	Handling Instruction
1. Record the direction of the 4-way valve before welding it. Do not refer to the other system.		● Record the direction of 4-way valve before removing it. ● remove the coil. ● Wrap the 4-way valve with wet cloth before welding so that it is complete and can be analyzed in the future. ● Remove the 4-way valve.
2. Clean the system, replace the 4-way valve of the same model. The piping should be the same as it is before removal.		● the new 4-way valve should be the same as the replaced one. If not, it should be confirmed by the professionals. ● wrap the the 4-way valve with wet cloth. ● Connect the the 4-way valve with the four connecting pipe according to the original direction. ● Connect the pipe by welding. ● Charge nitrogen when welding.
3. Pressurize and vacuumize the system. Recharge the refrigerant.		● Ensure that the vacuum degree is -1.0bar. The period for vacuuming is longer. ● The name and wight of the charged refrigerant should comply with the reqiurement marked on the nameplate.

Removal and Installation of Gas-Liquid Separator and Accumulator		
Remarks: reclaim the refrigerant. Prepare related equipment and tools and ensure the good ventilation of the working environment.		
Step	Illustration	Handling Instruction
1. Remove the gas-liquid separator and connecting pipe of the accumulator. Loosen the screws of the base and remove it.		● Remove the connecting pipe by heating with the soldering gun. ● Remove the fixing screw with spanner and remove the gas-Liquid separator and accumulator
2. Clean the system and replace the gas-Liquid separator and accumulator of the same model.		● Insatll the gas-Liquid separator and accumulator of the same model. Fix them with screws. ● Connect the pipe to the gas-Liquid separator and accumulator .
3. Assemble and weld the gas-Liquid separator and accumulator. Charge nitrogen during welding.		● Connect the pipe with the soldering gun. Notice: Charge nitrogen during welding.

Removal and Installation of Shell and Tube Exchanger		
Remarks: when inspect the water system and confirm that the shell and tube exchanger is damaged and needs to be replaced, cut off the power of the unit and reclaim the refrigerant.		
Step	Illustration	Handling Instruction
1. Loosen the water inlet and outlet. Remove the external front panel of shell tube.		● Drain the pipe. ● Remove the pipeline connected with shell tube. ● Remove the sheet metal at the lower side of tne unit.
3. Unsolder the tube connecting the heat exchanger (there may be different heat exchangers for different units, so connection position of each connection pipe must be marked during welding to avoid blow-by of the system by error connection.		● Wrap the welding place of connection between copper pipe of shell tube and tube with wet cloth. ● Remove the 4 pieces of pipeline with the welding gun.
4. Unscrew the 4 bolts fixing the heat exchanger support.		● Unscrew the 4 screws fixing the shell tube with the spanner. ● Pull out the shell tube.
5. Replace the new shell tube and connect its pipeline properly.		● Replace the new shell tube with the same model. ● Wrap the welding place of connection between copper pipe of shell tube and tube with wet cloth. Weld the pipline. ● Connect the water pipeline. ● Install the sheet metal.

Removal and Inatllation of Condenser		
Remark: Cut off power the unit and reclaim refrigerant.		
Step	Illustration	Handling Instruction
1.Remove the front panel indicated by the arrow (take replacement of condenser in the front)		● Reclaim the refrigerant completely ● Cut off power of the unit. ● Remove fan sub-assy and cut off power cord of fan motor and then remove sheet metal wrapping the condenser.
2. Remove metal grill outside the condenser.		● Remove grill of condenser.
3. Unsolder the inlet/outlet tube connecting condenser. Pay attention to flame direction of welding gun to avoid burnout of condenser fin and sheet metal sub-assy.		● Unsolder the connection pipe of condenser according to the left illustration.
4. Remove the clamp fixing the joint and unsolder the two pieces of small pipe at the bottom of condenser.		● Remove the support fixing the joint with a spanner. ● Unsolder the samll connection pipe of condenser according to the left illustration.
5. Install the new condenser and resume the fan and sheet metal.		● Install the new condenser according to the removal procedure of it. ● Weld each connection pipe with the welding gun. ● Re-connect the power cord of fan motor. Pay attention to sequence of connection wire of fan motor.

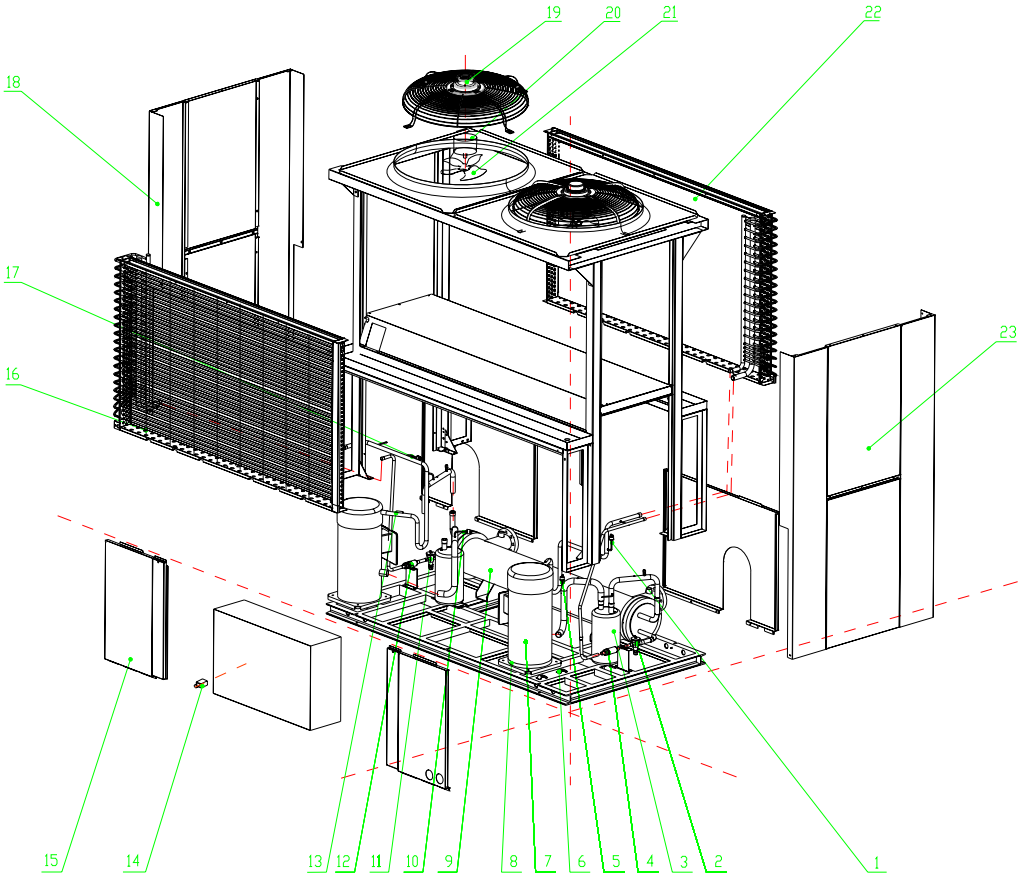
<table>
<tr><td colspan="3">Removal and Installation of Thermal Expansion Valve</td></tr>
<tr><td colspan="3">Remark: Check the various wirings of refrigerant system. If replacement of expansion valve is confirmed, cut off power of the unit to reclaim refrigerant.</td></tr>
<tr><td>Step</td><td>Illustration</td><td>Handling Instruction</td></tr>
<tr><td>1. Reclaim of refrigerant.</td><td>  </td><td>● Cut off power of the unit.
● Reclaim the refigerant.</td></tr>
<tr><td>2. Remove the expansion valve.</td><td>  </td><td>● In order to ensure completeness of expansion valve, wrap the 4-way valve with wet cloth.
● Unsolder the expansion valve with the welding gun.</td></tr>
<tr><td>3. Replace the new expansion valve.</td><td>  </td><td>● Replace the new 4-way valve with the same model.
● Wrap the new expansion valve with wet cloth and then install it. Connect the connection pipe.
● Weld it with welding gun.
Notice: Charge nitrogen into the pipe during welding.</td></tr>
</table>

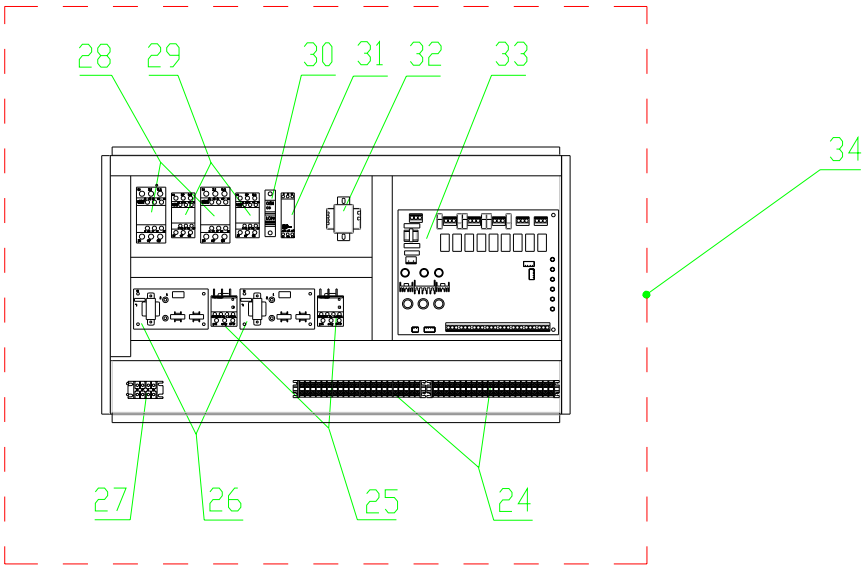
<table>
<tr><td colspan="3">Removal and Inatallation of Filter</td></tr>
<tr><td colspan="3">Remark: Check the various wirings of refrigerant system. If replacement of expansion valve is confirmed, cut off power of the unit to reclaim refrigerant.</td></tr>
<tr><td>Step</td><td>Illustration</td><td>Handling Instruction</td></tr>
<tr><td>1. Reclaim the refrigerant.</td><td> 
</td><td>● Cut off power of the unit.
● Reclaim the refrigerant.</td></tr>
<tr><td>2. Remove the filter.</td><td> 
</td><td>● In order to ensure completeness of filter, wrap the filter with wet cloth.
● Unsolder the filter with the welding gun.</td></tr>
<tr><td>3. Replace the new filter.</td><td> 
</td><td>● Replace the new filter with the same model.
● Wrap the new filter with wet cloth and then install it. Connect the connection pipe.
● Weld it with welding gun.
Notice: Charge nitrogen into the pipe during welding.</td></tr>
</table>

4 EXPLODED VIEWS AND PART LIST

1) Model: LSQWF65M/N-M、LSQWF80M/N-M

Exploded Views





LSQWF65M/N-M Parts List

No.	Name of part	Part code	Quantity
1	Pressure Protect Switch	46020003	1
2	Thermal Expansion Valve	'07130368	1
3	Gas-liquid Separator	'07228003	2
4	Bidirection Strainer	07210044	1
5	Pressure Protect Switch	460200044	1
6	Compressor Gasket	'02118049	6
7	Compressor and fittings	'00201108	2
8	Electric heater(compressor)	'76515211	4
9	Dry Evaporator	'01039987	1
10	Pressure Protect Switch	460200044	1
11	Thermal Expansion Valve	'07130368	1
12	Bidirection Strainer	07210044	1
13	Sensor sub-assy	'39001108	1
14	Scram switch	'45010010	1
15	Front Panel	01538078	2
16	Wind Grill	'01378001	2
17	Pressure Protect Switch	46020003	1
18	Front Panel	01538068	1
19	Fan Mesh Encloser	` 01478002	1
20	Fan Motor	'15018003	1
21	Centrifugal Fan	'10358001	1
22	Condenser Assy	'0110801701	2
23	Front Panel	01538070	2
24	Terminal Board(22 Bit)	'42010249	2
25	Thermal Overload Relay	'44020356	2
26	Over Current Protector	'46020113	2
27	Terminal Board(4 Bit)	'42011051	1
28	AC Contactor	'44010229	2
29	AC Contactor	'4401023501	2
30	Single-phase Air Switch	'45020203	1
31	Phase Reverse Protector	'46020054	1
32	Transformer	'4311024001	1
33	Main Board	'30222603	1
34	Electric Cabinet Assy	'01391115	1

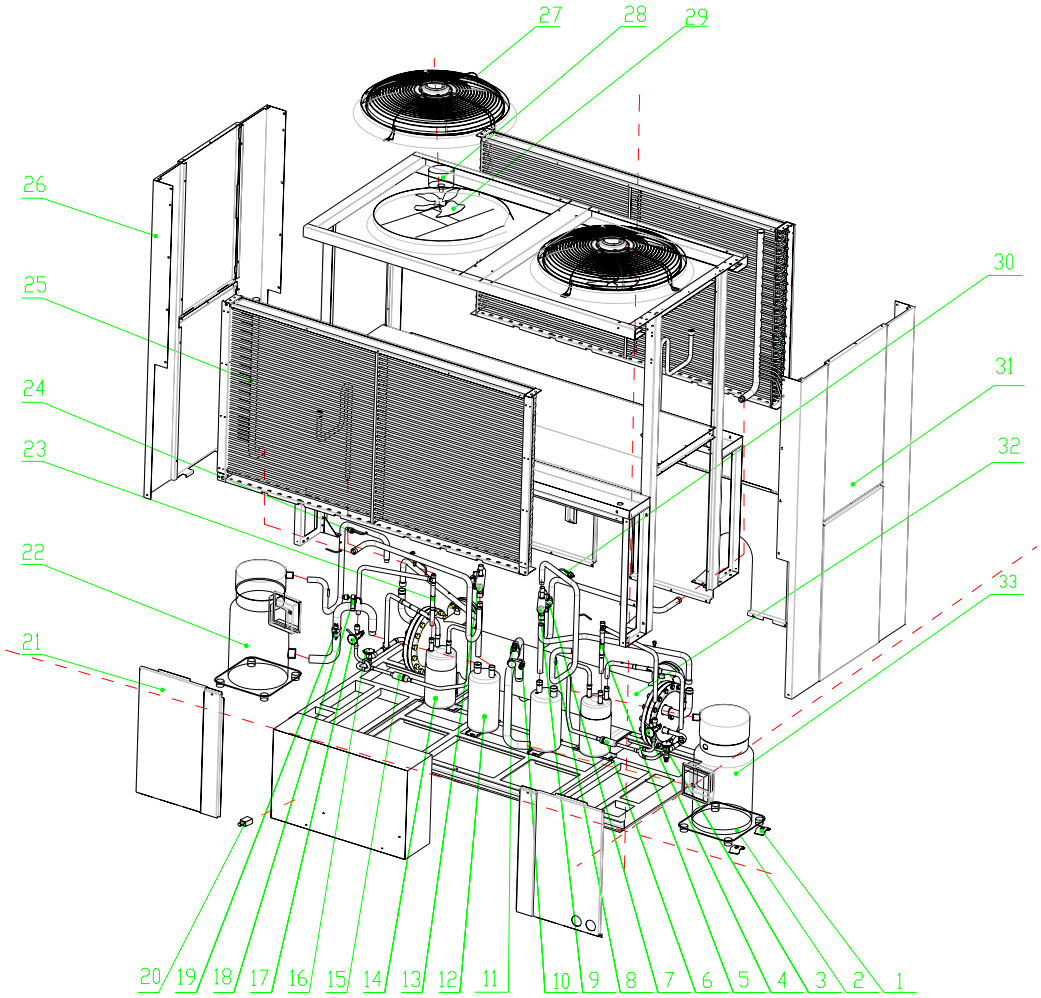
LSQWF80M/N-M Parts List

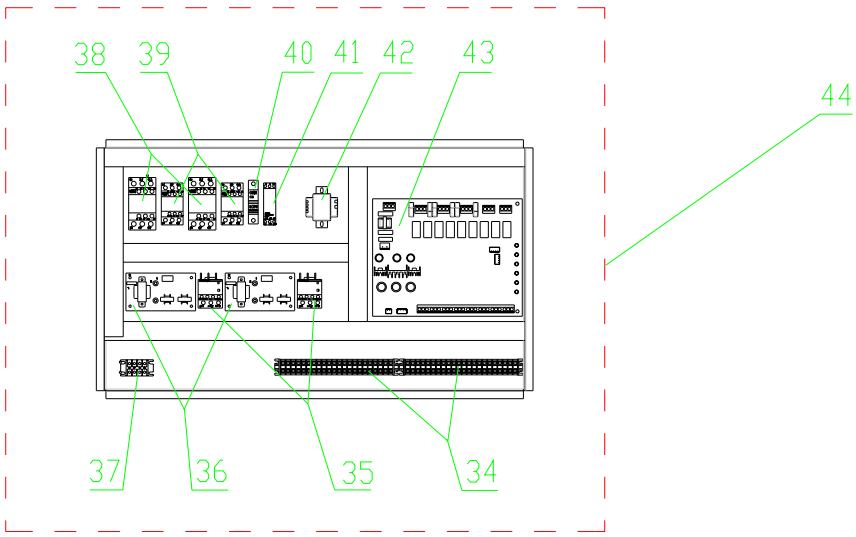
No.	Name of part	Part code	Quantity
1	Pressure Protect Switch	'46020003	1
2	Thermal Expansion Valve	'07130354	1
3	Gas-liquid Separator	'07228012	2
4	Bidirection Strainer	'07210044	1
5	Pressure Protect Switch	'460200044	1
6	Compressor Gasket	'02118049	6
7	Compressor and fittings	'00201109	2
8	Electric heater(compressor)	'765152121	4
9	Evaporator Assy	'010080131	1
10	Pressure Protect Switch	'460200044	1
11	Thermal Expansion Valve	'07130354	1
12	Bidirection Strainer	'07210044	1
13	Sensor sub-assy	'39001108	1
14	Scram switch	'45010010	1
15	Front Panel	01538078	2
16	Wind Grill	'01378001	2
17	Pressure Protect Switch	'46020003	1
18	Front Panel	01538068	2
19	Fan Mesh Encloser	` 01478002	1
20	Fan Motor	'15018003	1
21	Centrifugal Fan	'10358001	1
22	Condenser Assy	'0110801501	2
23	Front Panel	01538070	2
24	Terminal Board(22 Bit)	'42010249	2
25	Thermal Overload Relay	'44020356	2
26	Over Current Protector	'46020120	2
27	Terminal Board(4 Bit)	'420102471	1
28	AC Contactor	'44010229	2
29	AC Contactor	'44010240	2
30	Single-phase Air Switch	'45020203	1
31	Phase Reverse Protector	'46020054	1
32	Transformer	'4311024001	1
33	Main Board	'30222603	1
34	Electric Cabinet Assy	'01391145	1

2)

Model: LSQWRF65M/N-M、LSQWRF80M/N-M

Exploded Views





LSQWRF65M/N-M Parts List：

No.	Name of part	Part code	Quantity
1	Compressor Gasket	'02118049	6
2	Electric heater(compressor)	'76515211	4
3	Thermal Expansion Valve	'07331103	1
4	Thermal Expansion Valve	'07130368	1
5	One way Valve	07130111	1
6	Bidirection Strainer	'07210044	1
7	Magnet Coil	'430004009	1
8	Sensor sub-assy	'39001107	1
9	4-way Valve	'430004061	1
10	Pressure Protect Switch	460200044	1
11	Pressure Protect Switch	'46020007	1
12	Gas-liquid Separator	'07228003	2
13	4-way Valve	'430004061	1
14	Accumulator	'07421107	2
15	Bidirection Strainer	'07210044	1
16	Thermal Expansion Valve	'07331103	1
17	Thermal Expansion Valve	'07130368	1
18	Pressure Protect Switch	'460200044	1
19	Pressure Protect Switch	'46020007	1
20	Scram switch	'45010010	1
21	Front Panel	'01538078	2
22	Compressor and fittings	'00201108	1
23	One way Valve	07130111	1
24	Pressure Protect Switch	'46020003	1
25	Condenser Assy	'011080671	2
26	Front Panel	'01308044	1
27	Wind Grill	'01378001	2
28	Fan Motor	'15018003	1
29	Centrifugal Fan	'10358001	1
30	Pressure Protect Switch	'46020003	1
31	Front Panel	'01538070	2
32	Dry Evaporator	'01039987	1
33	Compressor and fittings	'00201108	1
34	Terminal Board(22 Bit)	'42010249	2
35	Thermal Overload Relay	'44020356	2
36	Over Current Protector	'46020113	2
37	Terminal Board(4 Bit)	'42011051	1
38	AC Contactor	'44010229	2
39	AC Contactor	'4401023501	2
40	Single-phase Air Switch	'45020203	1
41	Phase Reverse Protector	'46020054	1

42	Transformer	'4311024001	1
43	Main Board	'30222603	1
44	Electric Cabinet Assy	'01391115	1

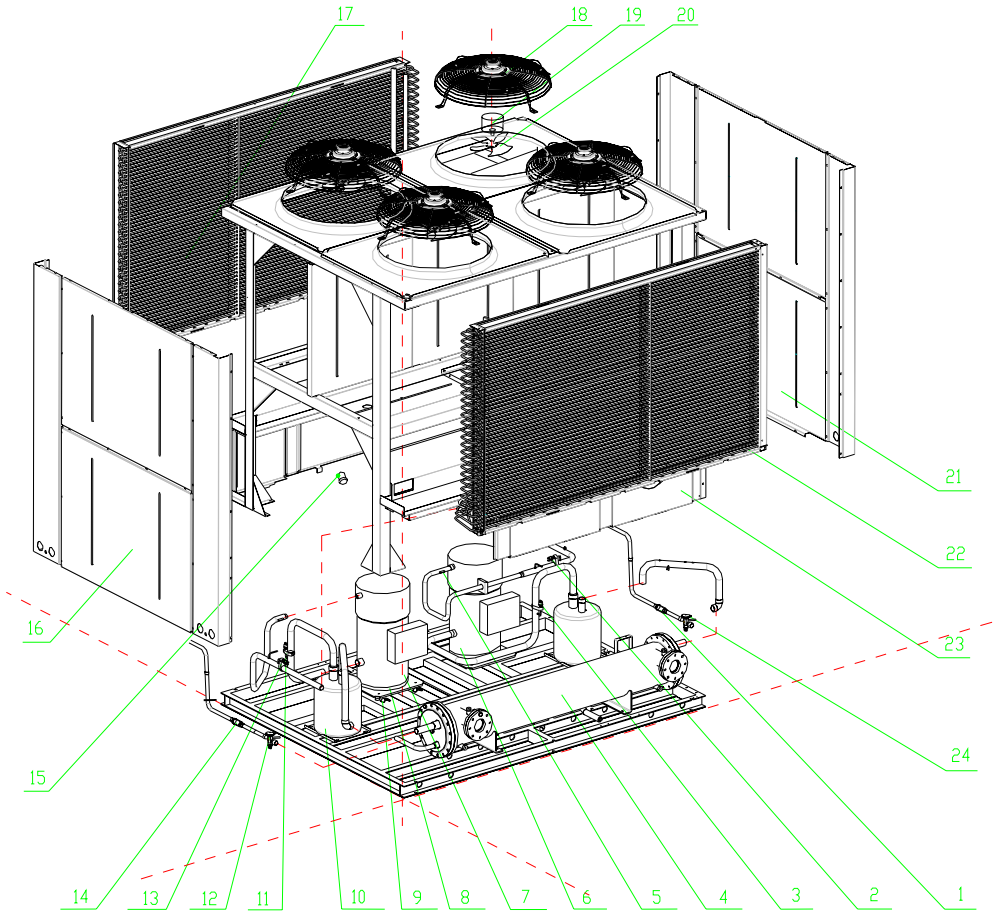
LSQWRF80M/N-M Parts List：

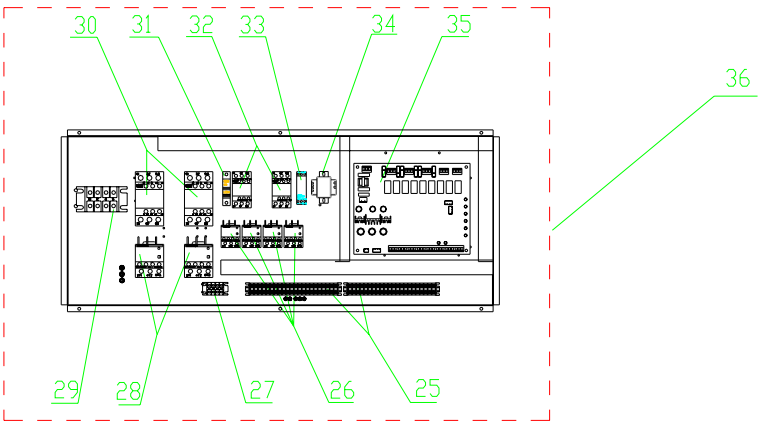
No.	Name of part	Part code	Quantity
1	Compressor Gasket	6	'02118049
2	Electric heater(compressor)	4	'76515212
3	Thermal Expansion Valve	1	'07130327
4	Thermal Expansion Valve	1	'07130354
5	One way Valve	1	'07138042
6	Bidirection Strainer	1	'07210044
7	Magnet Coil	2	'430004009
8	Sensor sub-assy	1	'39001107
9	4-way Valve	1	'43008003
10	Pressure Protect Switch	1	'460200044
11	Pressure Protect Switch	1	'46020007
12	Gas-liquid Separator	2	'07228008
13	4-way Valve	1	'43008003
14	Accumulator	2	'07421108
15	Bidirection Strainer	1	'07210044
16	Thermal Expansion Valve	1	'07130354
17	Thermal Expansion Valve	1	'07130327
18	Pressure Protect Switch	1	'460200044
19	Pressure Protect Switch	1	'46020007
20	Scram switch	1	'45010010
21	Front Panel	2	'01538078
22	Compressor and fittings	1	'00201109
23	One way Valve	1	'07138042
24	Pressure Protect Switch	1	'46020003
25	Condenser Assy	2	'011080142
26	Front Panel	1	'01538068
27	Wind Grill	2	'01378001
28	Fan Motor	1	'15018003
29	Centrifugal Fan	1	'10358001
30	Pressure Protect Switch	1	'46020003
31	Front Panel	2	'01538070
32	Dry Evaporator	1	01039986
33	Compressor and fittings	1	'00201109
34	Terminal Board(22 Bit)	2	'42010249
35	Thermal Overload Relay	2	'44020356
36	Over Current Protector	2	'46020120
37	Terminal Board(4 Bit)	1	'420102471
38	AC Contactor	2	'44010229

39	AC Contactor	2	'4401023501
40	Single-phase Air Switch	1	'45020203
41	Phase Reverse Protector	1	'46020054
42	Transformer	1	'4311024001
43	Main Board	1	'30222603
44	Electric Cabinet Assy	1	'01391114

3) Model: LSQWF130M/N-M

Exploded Views





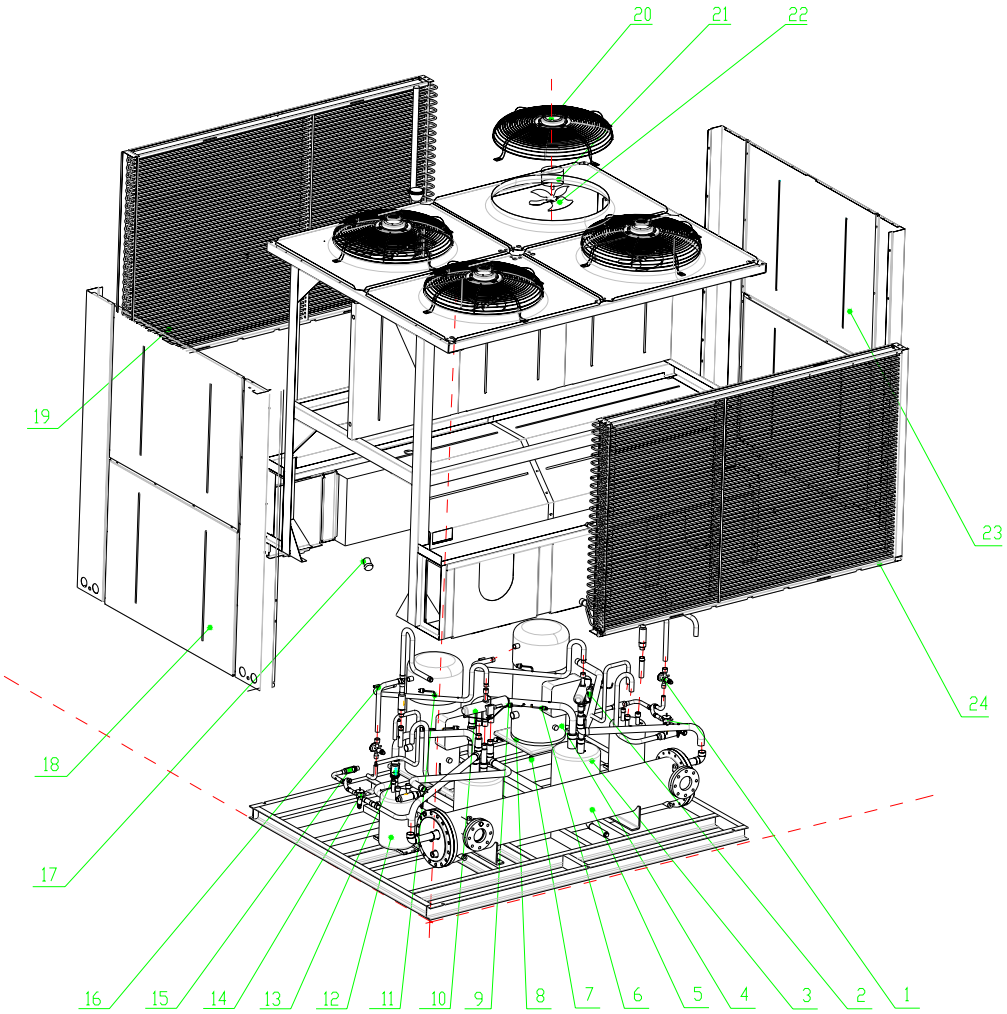
Parts List：

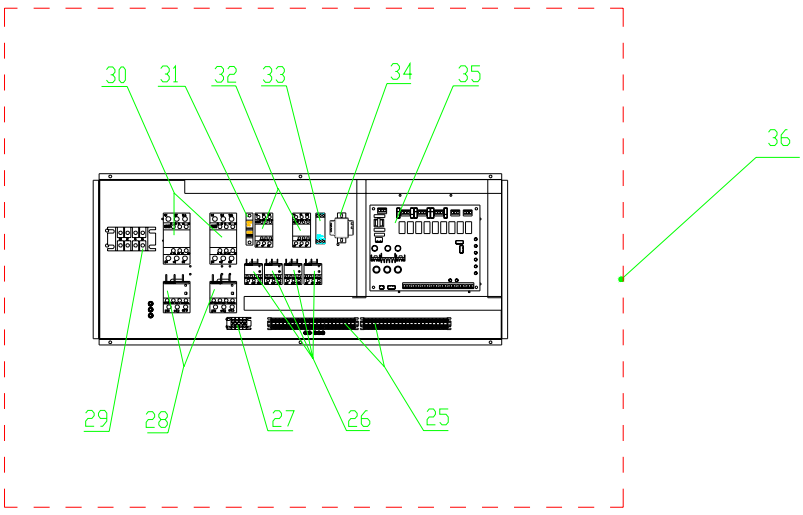
No.	Name of part	Part code	Quantity
1	Gas Tube Filter	07219051	1
2	Pressure Protect Switch（high）	46020003	1
3	Pressure Protect Switch（low）	460200044	1
4	Dry Evaporator	'01039985	1
5	Sensor sub-assy	'39001104	1
6	Compressor and fittings	00108144	1
7	Compressor and fittings	00108144	1
8	electrical heater	'76518731	2
9	Compressor Gasket	'02118049	8
10	Gas-liquid Separator	'07421110	2
11	Pressure Protect Switch（low）	460200044	1
12	Thermodynamic Expansion Valve（left）	07130343	1
13	Pressure Protect Switch（high）	46020003	1
14	Gas Tube Filter	07219051	1
15	Scram switch	'45010010	1
16	Front Panel（left）	01538007	2
17	Condenser Assy	'0112112302	2
18	Fan Mesh Encloser	'01478003	1
19	Fan Motor	'15018002	1
20	Centrifugal Fan	'10358002	1
21	Front Panel（right）	01538009	2
22	Wind Grill	'01368007	4
23	Front Panel（down）1	01538013	2
24	Thermodynamic Expansion Valve（right）	07130343	1
25	Terminal Board(22 Bit)	'42010249	2
26	Thermal Overload Relay	'44020356	4
27	Terminal Board(4 Bit)	'42010254	1
28	Thermal Overload Relay	'44020383	2
29	Terminal Board(4 Bit)	'420102471	1
30	AC Contactor	'44010229	2
31	Single-phase Air Switch	'45020203	1
32	AC Contactor	'44010280	2
33	Phase Reverse Protector	'46020054	1
34	Transformer	'4311024001	1
35	Main Board	'30222006	1

36	Electric Cabinet Sub-Assy	'01391150	1

4) Model: LSQWRF130M/N-M

Exploded Views





Parts List：

No.	Name of part	Part code	Quantity
1	Thermal Expansion Valve	'07130343	2
2	Magnet Coil	'43040008	2
3	Gas-liquid Separator	'07421110	2
4	Compressor and fittings	'00201107	2
5	Dry Evaporator	'01039985	1
6	Pressure Protect Switch	'460200044	2
7	Compressor Gasket	'02118049	3
8	Electric heater(compressor)	'76515404	2
9	Pressure Protect Switch	'46020007	2
10	4-way Valve	'43000409	2
11	Pressure Protect Switch	'46020003	1
12	Accumulator	'07421105	2
13	One way Valve	` 07138101	4
14	Thermal Expansion Valve	'07130343	2
15	Gas Tube Filter	'07219051	2
16	Sensor sub-assy	'39001103	1
17	Scram switch	'45010010	1
18	Front Panel（left）	'01538007	2
19	Condenser Assy	'0110807001	2
20	Fan Mesh Encloser	'01478003	1
21	Fan Motor	'15018002	1
22	Centrifugal Fan	'10358002	1
23	Front Panel（right）	'01538009	2
24	Wind Grill	'01368007	4
25	Terminal Board(22 Bit)	'42010249	2
26	Thermal Overload Relay	'44020356	4
27	Terminal Board(4 Bit)	'42010254	1
28	Thermal Overload Relay	'44020383	2
29	Terminal Board(4 Bit)	'420102471	1
30	AC Contactor	'44010229	2
31	Single-phase Air Switch	'45020203	1
32	AC Contactor	'44010280	2
33	Phase Reverse Protector	'46020054	1
34	Transformer	'4311024001	1
35	Main Board	30222006	1
36	Electric Cabinet Assy	'01391133	1